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High-molecular weight compounds. XXII. Influence of polarity of substituents on polymerizability of substituted ethylenes. V. V. Korshak (Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel Khim. Nauk* 1949, 487-92; cf. C.A. 44, 3951a. —Theoretical review (11 references) and discussion. The polymerizability of substituted ethylenes is directly connected with their dipole moments and the increase of polymerizability is caused by polarization of the C-C link under the influence of the substituent. The dipole values are taken from Sytkin and Dyatkina (*The Chem. Bond and the Structure of Mols.*, 1946 (C.A. 41, 5010b)). The regular structure of the polymers is also explained by the bond polarization. Generally, introduction of polar groups adjacent to a CO group decreases polymerizability by decreasing the polarizability of the CO link. Similar polarization factors are believed to influence the polymerization of such rings as ethylene oxide, ethylenimine, lactones, and lactams.

XXIV. Causes for stoppage of chain growth in polycondensation reactions. V. V. Korshak (Acad. Sci. U.S.S.R., Moscow). *Ibid.* 1950, 47-50. —Discussion, in which it is pointed out that stoppage of chain growth may occur even with strictly stoichiometric proportions of reagents and may be caused by evapn. of 1 of the components, or it may result from termination reactions, such as: decarboxylation, deamination, dehydration, and particularly ring closure at the end of the growing chain.

XXV. Mechanism of linear polycondensation reactions. S. R. Rafikov, V. V. Korshak, and G. N. Chelnokova. *Zhur. Obshchei Khim.* 19, 2100-17; *J. Gen. Chem. U.S.S.R.* 19, No. 11, 2581-9 (1949) (English translation); cf. C.A. 43, 65785. —The distribution of mol. wts. of polyesters from adipic acid and $\text{HOCH}_2\text{CH}_2\text{OH}$ shows a decided max. with an absence of products of higher mol. wts. than 20% above the mean mol. wt.; this is contrary to the theoretical calcus. by

Flory's method (C.A. 30, 7041f; 40, 6881f), which gives a rather flat curve. The mechanism of polyesterification is discussed and it is shown that the basic factor which determines the characteristics of the products is the reversible set of reactions of alcoholysis and acidolysis of the polyesters, either at chain ends or by inter-chain processes. XXVI. One peculiarity of chemical destruction process in compounds of high molecular weight. V. V. Korshak. *Izvest. Akad. Nauk S.S.S.R., Otdel Khim. Nauk* 1950, 51-5. —Discussion of depolymerization processes (16 references) in high-mol. substances. The coeff. of polymerization in a process in which the destruction (i.e. depolymerization) has reached equil. conditions may be treated kinetically if the degree of depolymerization is assumed to be proportional to the concn. of the destructive agent; such coefficients of polymerization, called, in theoretical cases show that the most profound effect on the av. mol. wt. of the polymer arises from depolymerization of the products of highest mol. wt. in the mixts. and curves for several hypothetical cases are presented. As a result, there is a tendency for the mol. wts. of the mixt. to approach homogeneity, i.e. the coeff. of polydispersity tends toward unity.

G. M. Kosolapoff

RAFIKOV, S.R.

22356-Rafikov, S.R. Raboty A.M. Butlerova V. Oblasti Sinteza I Issledovaniya
Vysokomolekulyarnykh Soyedineniy. Vysokomolekulyar. Soyedineniyakh, Vyp. 9, 1949,
S. 70-75.-Bibliogr: S. 75

SO: Letopis' No. 30 1949

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Investigations in the Field of High-Molecular Weight
Compounds. XXV. The Mechanism of Linear Poly-
condensation Reactions. (In Russian) S. R. Radkov,
V. V. Korshak, and G. N. Chelnokova. *Zhurnal Obsh-
chei Khimii* (Journal of General Chemistry) 5, 1981
Nov. 1949, p. 2109-2117.
11 references

RAFIKO., S. R.

TA 25/4917

USSR/Chemistry -- Kinetics
Chemistry -- Esterification

Jan 49

"The Problem of Reaction Kinetics in Polyesterification," S. R. Rafikov, V. V. Korshak, 4 pp

"Dok Ak Nauk SSSR" Vol LXXIV, No 2

Investigates reaction kinetics of polyesterification for the case of interaction of adipic acid with decamethyleneglycol and ethyleneglycol. Concludes that reaction speed of polyesterification will depend not upon chain's length, but upon concentration of free groups capable of reaction. Submitted 7 Oct 48.

25/4917

1ST AND 2ND EDITIONS										3RD AND 4TH EDITIONS									
PROCESSING AND PROPERTY INDEX																			
<p>CA</p>										<p>2</p>									
<p>Kinetics of the polyamidation reaction. G. N. Chelno- kova, B. R. Kufikov, and V. V. Korshak. <i>Doklady Akad Nauk S.S.S.R.</i> 64, 863-4(1949).—The reaction between sebacic acid and hexamethylenediamine, in <i>m</i>-cresol solu- (1:1 by wt. to the amine sebacate), resulting in the for- mation of polyamides of linear structure, according to $\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2 + \text{HOOC}(\text{CH}_2)_8\text{COOH} \rightarrow \text{H}(\text{HN}(\text{CH}_2)_6\text{NHOC}(\text{CH}_2)_8\text{CO})_n$ + $(2n-1)\text{H}_2\text{O}$, followed by titration of NH groups with 0.1 <i>N</i> cresolsulfonic acid in CHCl_3 + <i>m</i>-cresol (1:1) with cresol red as indicator, is of the 2nd order, with the rate const. $k = 0.0800, 0.0337, 0.0192, 0.0121, 0.0032, 0.0018$ millimole/g./min., at 185, 175, 167, 160, 145, 140°, resp. The mol. wts. of the product are, resp., 5300, 4100, 2200, 1900, 720, 300. Only at higher temps. does k obey the Arrhenius equation; the deviation below 160° is probably due to increased viscosity. In the range of validity of the Arrhenius equation, the activation energy = 24.0 kcal / mole. The temp. coeffs. between 145-65°, 165-75°, and 175-85° are, resp., 2.78, 1.91, and 1.75. At 145°, ZnCl_2 and H_3PO_4 have only an insignificant accelerating effect. N. Thom</p>																			
<p>ASB-5LA METALLURGICAL LITERATURE CLASSIFICATION</p>																			
<p>100000 412 014 011</p>										<p>100000 412 014 011</p>									
<p>100000 412 014 011</p>										<p>100000 412 014 011</p>									

RAFIKOV, S. R.

PA 27/49T7

USSR/Chemistry - Amides, Formation
Chemistry - Hydrolysis

Jan 49

"The Kinetics of Amide Formation and Hydrolysis,"
G. N. Chelnokova, S. R. Rafikov, V. V. Korshak, 3 pp

"Dok Ak Nauk SSSR" Vol LXIV, No 3

Kinetic study of the reaction of sebacic acid with
hexamethylenediamine under varying conditions (tem-
perature and catalysis). Submitted 8 Oct 48.

27/49T7

RAPIKOV, S.R.

531. Plastmassy. (Plastics.) S. R. RAPIKOV.
Moscow: Gos. Izd. Tekhniko-Teoret. Lit.; 1962,
pp. 47. Price, 96 kopeks. This popular booklet sets

out to show what plastics are, what their internal structure is, and how the different types of plastics have been developed, starting from simple raw materials such as petroleum and coal. Well-illustrated descriptions are given of dwarf molecules and giant molecules and of the history of plastics, including synthetic rubber, reference being exclusively to Russian workers.

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Chemistry - Organic

9.1.8

6243' The Mechanism of Catalytic Oxidation of Tetralin
and Decalin in the Vapor Phase. In Russian. S. B. Rudkov
and B. V. Savinov. *Doklady Akademii Nauk SSSR*, new ser.
V. 82, Jan. 4, 1952, p. 61-63.
Briefly discusses the above.

Chemistry Department

6.1.1

6244* Catalytic Oxidation of the Basic Components of Turpentine in the Vapor Phase. - In Russian: S. R. Rukhkov and B. V. Savorov. *Doklady Akademii Nauk SSSR* new ser. v. 82, Jan. 11, 1952, p. 265-267. Briefly discusses chemistry of the above. 11 ref.

Organic Chemistry

Mechanism of the catalytic oxidation of *p*-cymene in the gas phase. S. R. Rafikov and B. V. Suvorov (Chem. Inst. Acad. Sci., Kazakh S.S.R.). *Doklady Akad. Nauk S.S.S.R.* 82, 415-17 (1952).—Under conditions of mild oxidation of vapor of *p*-Me₂CHC₆H₄Me on V₂O₅, the main products are *p*-MeC₆H₄CO₂H, *p*-C₆H₄(CO₂H)₂, CO₂, and H₂O. Other identified products are *p*-MeC₆H₄COMe, *p*-Me₂CHC₆H₄CHO, *p*-O₂C₆H₄O, HCHO, and some BzH, BrOH, AcOH, *p*-C₆H₄(OH)₂, and *p*-MeC₆H₄OH. Absent were *p*-Me₂CHC₆H₄CO₂H and *p*-MeC₆H₄CHO. Maleic anhydride, (C₆H₅)₂, and HCO₂H, which are known to be formed in the oxidation of *p*-O₂C₆H₄O and of C₆H₆, were not found. Nor could peroxide compds. be detected. A complete scheme of the oxidation is proposed in which the variety of products is derived from a primarily formed hydroperoxide, *p*-Me₂C(OOH)C₆H₄Me, and a peroxide, *p*-MeC₆H₄(OOC₂H₅)₂.

An intermediate *p*-MeCOC₆H₄Me can be oxidized to the intermediate hydroperoxide, *p*-HOOC₂H₄CO₂C₆H₄Me. The failure to detect the peroxides is due to their instability and rapid further reactions. The main feature of the catalytic oxidation is the primary attack on the iso-Pr group, in contrast to the low-temp. liquid-phase oxidation (Sensenbrenner and Stubbs, C.A. 26, 6924) where the products are *p*-Me₂CHC₆H₄CO₂H and *p*-Me₂CHC₆H₄CHO. N. Thon

PA 24014

USSR/Chemistry - Peroxides

Dec 52

"The Decomposition Mechanism of Benzoyl Peroxide in Solvents," S. R. Rafikov and V. S. Kudinova, Inst of Chem Sci, Acad Sci Kaz SSR, Alma-Ata

"DAN SSSR" Vol 87, No 6, pp 987-990

The decomn of benzoyl peroxide was studied in benzene and ethyl alc. It was found that the mechanism of the decomn depends on the solvent. In solvents which are incapable of reacting with the peroxide group, the decomn is thermal, while in solvents which are capable of reacting with the

24014

peroxide group, the decomn is one of simple exchange of radicals temps below that of thermal decomn. The kinetics and chain mechanisms of the decomn are discussed in detail. The inhibiting action of hydroquinone is explained. Presented by Acad A. N. Nesmeyanov 25 Apr 52.

24014

RAFIKOV, S. R.

Rafikov, S.R.

High-molecular weight compounds. LV. Application of reactions of interchain exchange to processes of linear polycondensation. S. R. Rafikov, V. V. Korschak, and G. N. Chelnokova (Inst. Org. Chem. Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otd. Khim. Nauk* 1953, 743-50; cf. C.A. 48, 3912g, 8918e. — It was shown that the ester links in polyesters can undergo exchange reactions with free HO, CO₂H, or amino groups. The polyamide links are, however, broken only under the attack of amino or CO₂H groups, and are stable toward HO groups of alcs. Narrow fractions of polyesters undergo on heating an extensive change which results in a heterogeneous product whose mol. wt. and structure approaches that of the polyester formed by reaction of the glycol with the dicarboxylic acid (adipic). Heating 7.2 g. adipic acid with 17.4 g. (CH₂OH)₂ 9 hrs. at 180° gave 3.4 g. H₂O-glycol mixt., and the residue heated to 150°/2 mm. yielded 8 g. distillate, which taken up in EtOH and ppd. with H₂O, formed a waxy solid, m. 28-9°, whose mol. wt. was 232, corresponding to the diglycol ester of adipic acid. This heated 4 hrs. to 180°/10-12 mm. gave 1.7 g. distillate and yielded a colorless polyester, m. 38-40°, mol. wt. 1800. Heating di-Bt adipate with (CH₂OH)₂ (equimolar amts.) yields polyesters with mol. wts. up to

1250, when 1% p-MeC₆H₄SO₃H or EtONa catalyst is used and the temp. is kept at 160-95° for 6-7 hrs.; di-Bu adipate reacts less rapidly. Heating di-Bu adipate with a slight excess of (CH₂)₆(NH₂)₂ 3 hrs. at 225-30° gave 1 g. BuOH and yielded a product, m. 190-200°, mol. wt. about 930, which was a polyamide contg. 3 diamine residues per 4 adipate units and 2 BuO groups; extd. with EtOH, it yielded an amorphous powder, m. 108-12°, mol. wt. 385-630. Heating equimolar amts. of adipic acid and AcNH(CH₂)₄NHAc 2 hrs. at 180-200° and 2 hrs. at 210-15° gave 0.25 g. AcOH and polyhexamethylenedipamide, m. 242-5°, mol. wt. 2000. A similar reaction with di-Bt adipate failed to take place even at 210° without a catalyst; in the presence of 0.1 g. p-MeC₆H₄SO₃H a polyamide, m. 244-7°, was formed. Adipamide (14.4 g.) and 31 g. (CH₂OH)₂ heated 3 hrs. at 200° gave 14.1 g. initial diamide. The polyester from adipic acid and (CH₂OH)₂ was fractionally pptd. from C₆H₆ by petr. ether (distribution curve is shown); a narrow fraction, mol. wt. 1100, was heated in sealed tube 42 hrs. at 170°, and fractional pptn. of the product gave a mol. wt. distribution that was very close to that of the initial heterogeneous polyester. LIX. Stereochemistry of α-methylstyrenes in connection with their ability to polymerize. V. V. Korschak and N. G. Matveeva. *Ibid.* 751-6. — Neither 2,6-(MeO)₂C₆H₃CMc:CH₂ (I) nor 2,6,4-MeO(Me₂C)₂C₆H₃CMc:CH₂ (II) could be polymerized. This result is explained by steric hindrance by the 2-o-groups and the α-Me group. II could not be prepd. with RMgX but was prepd. with organo-Na compds. 2,6,4-MeO(Me₂C)₂C₆H₃Ac (100 g.), 210 g. MeI, and 48 g. Na powder in Et₂O treated with 1 ml. EtOH to start the reaction, and, after the initial reaction, the mixt. refluxed 1 hr., kept overnight, and worked up in the conventional manner yielded 15.5% II, b_p 124-5°, d₂₀ 0.9489, n_D²⁰ 1.5050, after distn. of the org. layer in vacuo. 2,6-(MeO)₂C₆H₃Ac with MeMgI similarly gave 47.6% I, b_p 136-8°, b_p 92-4°, m. 30-7° d₂₀ 1.043. G. M. Kosolapoff

CHELMOKOVA, G. N., KORSIAK, V. V., AND RAFIKOV, S. R.

From the Field of High Molecular Compounds. XLIX. Reaction Characteristics of Monoethylamine With Adipic and Sebacic Acids

Investigated the condensation reaction of monoethylamine with adipic acid in order to clarify the reaction mechanism and the intermediate products. Also investigated the condensation of the ethyl ester of epsilon-aminocaproic acid into a polymer. (RZhKhim, No. 1, 1955)
Sb. Statey po Obshch. Khimii, M.-L., Izd-vo AN SSSR, Vol 2, 1953, 1075-1080.

SO: Sum. No. 744, 8 Dec 55 - Supplementary Survey of Societ Scientific Abstracts (17)

RAFIKOV, S. R., GUTSALYUK, V. G., and EPEL'BAUM, Kh. I.

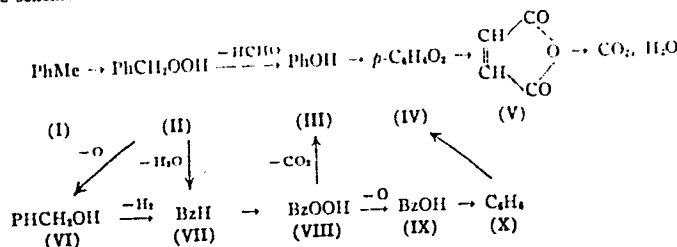
"Viscosity of Paraffin-Base Petroleum at Low Temperatures," Izv. AN Kazakh. SSR, ser. khim., No 7, 1953, pp 111-117

Investigated the effect of cooling rate on dynamic viscosity for two samples of paraffin-base petroleum differing in paraffin content. Established that presence of paraffin affects structural viscosity of the petroleum. Rapid cooling of a paraffin-base petroleum produces many small crystals resulting in a large total surface which is bonded to the liquid phase, thus increasing the total volume of the solid phase, which brings about an increase in viscosity. Slow cooling produces large crystals with a smaller total surface and hence brings about a lower viscosity. (RZhKhim, No 19, 1954)

CC: Cu . No 562, 6 Jul 55

Mechanism of the vapor-phase oxidation of toluene, benzyl alcohol, and benzaldehyde, in the presence of vanadium pentoxide, B. V. Suvorov, S. R. Raikov, and I. G. Anuchina, *Dokl. Akad. Nauk S.S.S.R.* 88, 79-82 (1953). Oxidation of PhMe in the temp. range 300-75° yields mainly CO₂, H₂O, BzH, BzOH, quinone, maleic anhydride, and anthraquinone, and small amts. of PhOH and HCHO. The process can be represented by the scheme of these products, only VI was

Chemical Abst.
Vol. 48 No. 4
Feb. 25, 1954
Organic Chemistry



not detected. The scheme involves 2 intermediate peroxides, II and VIII. Anthraquinone (XI) was detected in the oxidation of I, but not in the oxidation of either VI or VII. The formation of XI evidently proceeds by way of I + O₂ + I $\xrightarrow{-\text{H}_2\text{O}}$ C₁₄H₁₀ → XI. In the oxidation of I, the total amt. of VII + IX does not exceed 4%; that this is due to further reactions of VII and IX follows from the observation with a contact time shortened by a factor of 4, the yield of

VII is as high as 25% of the original I. In the oxidation of pure VII in the same temp. range, the main products are IX, IV, and V; as a function of the temp., their amts. pass, successively, through max. Advance addn. of H_2O increases the total yields markedly, but without altering the consecutiveness of the max. Oxidation of VI also yields, in the main, the products of incomplete oxidation, but in somewhat smaller amts. than VII. Production of VII and of IX proceeds simultaneously; this is taken as evidence that IX is formed not only from VII, but also directly from VI, over the corresponding hydroperoxide, $VI \xrightarrow{+O_2} PhCH(OH)OOH \xrightarrow{-H_2O} IX$. Addn. of H_2O vapor again increases the yields of the intermediate products, without altering the disposition of the max.

N. Thon

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RAFIKOV, S. R.

Oxidation of organic compounds. IV. Catalytic oxidation of tetrahydronaphthalene and decahydronaphthalene in vapor phase. B. V. Suvorov and S. R. Rafikov. *Izvest. Akad. Nauk Kazakh. S.S.R.* No. 118, Ser. Khim., No. 6, 82-9(1953); cf. *ibid.* No. 5(1951).—The oxidation of tetra- and decahydronaphthalene in the vapor phase over V oxides was examd. The 1st phase of the reaction was shown to be dehydrogenation to $C_{10}H_8$. The main reaction products are o - $C_{10}H_6(CO)_2O$, 1,4-naphthoquinone, $C_{10}H_6$, H_2O , and CO_2 . Small amts. of β -naphthoquinone, BzH and $BzOH$ are found. The overall reaction scheme can be developed from the peroxide theories expressed by Bakh [*J. Russ. Phys. Chem. Soc.* 29, 373(1897)]. The "hydroxy" hypothesis is severely criticized for being unable to predict the actual reaction products. G. M. Kosolapoff

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R. A. F. Kou, S. R.

2000

✓ Research in the oxidation of organic compounds. S. R. Rafikov and B. V. Suvorov. *Izvest. Akad. Nauk Kazakh. S.S.R. No. 120, Ser. Khim. No. 5, 85-90 (1953).*— α -Pinene (I) or *dl*-limonene (II) vapor oxidized in air on hot V_2O_5 gave *p*- MeC_6H_4COMe (III), *p*-toluic acid, cumaldehyde, terephthalic acid, *p*-cresol (IV), $BzOH$, BzH , CH_3O , hydroquinone, and *p*-quinone (V). I first isomerized into II, dehydrogenation of which gave *p*-cymene and *p*-isopropenyltoluene; these formed peroxides which decompd. to give IV and III, resp. The peroxides of III and IV formed aldehydes, acids, and finally V, which oxidized into CO_2 and water; only here did the benzene ring break. Equations are given. Malcolm Anderson

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RAFIKOV, S.R.

1. Oxidation of organic compounds. V. Oxidation-reduction reaction of furfural with formaldehyde. S. R. Rafikov and Kh. M. Mirfajizov. *Izvest. Akad. Nauk Kazakh. S.S.R. No. 123, Ser. Khim. No. 7, 40-53 (1953); cf. Vestnik Akad. Nauk Kazakh. S.S.R. No. 8, 115 (1950); C.A. 48, 12717f.*—A large excess of CH_2O in a crossed Cannizzaro reaction with furfural is useless, as the course of the reaction is detd. by the oxidation-reduction properties of the substances involved and not by their relative aunts. The bulk of the furfural alc. (I) is formed within 3 hrs. and the best reaction temp. is 15-25°. The yield of pure I at a 1:1 to 1:1.5 ratio of furfural to CH_2O is 70-3%. Furfural is readily prepd. from reeds by hydrolysis with 10% HCl in the presence of NaCl with continuous steam distn.; a 9.7% yield (dry wt.) is obtained. Furfural (0.4 mole), 1.3 moles CH_2O (as a 35% soln.), and 90 ml. H_2O treated over 60 min. with 120 g. 50% NaOH gave, after a final 4 hrs. at 40-5°, 78% pure I. Oxidation of organic compounds. VI. Reaction of decomposition of benzoyl peroxide in benzene. S. R. Rafikov and V. S. Kudinova. *Ibid.* 54-59.—Decompn. of Bz_2O_2 in C_6H_6 proceeds noticeably with evolution

of CO_2 at 70° or above. At low temps. there occurs a reversible decompn. with formation of BzO radicals, while at higher temps. the decompn. yields Ph radical and CO_2 , the amt. of the latter rising with the temp. The main reaction products are BzOH , Ph , $(\text{PhC}_6\text{H}_5)_n$, and resins of the polyphenyl type, along with small aunts. of BzOPh , PhC_6H_5 , and traces of H_2 . It is suggested that the decompn. in which Ph and BzO radicals are formed is followed by reaction of these with the solvent to yield the above listed products. The reaction shows the characteristics of branched-chain reactions. VII. Mechanism of the catalytic oxidation of camphene, cineole, and bornyl acetate in the vapor phase. B. V. Suvorov and S. R. Rafikov. *Ibid.* 70-4.—The vapor-phase oxidation over a V catalyst of camphene and 1,8-cineole with air gave *p*-cresol, *p*-toluic and terephthalic acids, *p*-benzoquinone, CH_2O , and CO_2 . Bornyl acetate gave no aromatic products or their *O*-derivs., thus indicating more rapid decompn. of the ring system. It is probable that the 1st 2 substances yield an *O*-bridged structure hydrating to a *p*-di-HO deriv., which is dehydrated to a diene, which then undergoes oxidation proper. G. M. Kosolapoff

RAFIKOV, S.R.; KUDINOVA, V.S.

Oxidation of organic compounds. Part 6. Decomposition of benzoyl
peroxide in benzene. Izv. AN Kazakh. SSR no. 123:54-69 '53.
(MLRA 7:3)
(Benzoyl peroxide)

SUVOROV, B.V.; RAFIKOV, S.R.

Oxidation of organic compounds. Part 7. Mechanism of catalytic
oxidation of vapor phase camphene, cineole, and bornyl acetate.
Izv. AN Kazakh. SSR no. 123:70-74 '53. (MLBA 7:3)
(Oxidation) (Terpenes)

GUTSALYUK, V.G.; EPEL'BAUM, Kh.I.; RAFIKOV, S.R.

Viscosity of paraffin-base petroleum at low temperatures. Izv.
AN Kazakh.SSR no.123:111-117 '53. (MLRA 7:3)
(Petroleum) (Viscosity)

RAFIKOV, S. S.

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Dehydrogenation and irreversible catalysis of dipentene on vanadium oxides. S. R. Rafikov, B. V. Suvorov, and L. K. Tuturova. *Doklady Akad. Nauk S.S.S.R.* 94, 895-8 (1954).—Passage of pure dipentene over V oxide catalyst in absence of O_2 at 300–550° gave the following results: from 300 to 50° there is a decline in the yield of unsaturates (from 80% to 37%), and along with dehydrogenation there is formation of *p*-cymene. At higher temp. the yield of the latter rises (to 80%) and menthane appears in the catalyzate. Above 475° dehydrogenation predominates and the yield of *p*-cymene drops; menthane is absent and the yield of *p*-isopropenyltoluene and H_2 rises, apparently as a result of direct dehydrogenation of the starting material. If enough air is admitted into the reaction tube to consume the liberated H_2 , no menthane is formed, and the yield of *p*-cymene drops from 80% to 59%; not all H_2 is oxidized, however. At 450–500° there are found small amts. of Me_2CO and *p*-methylacetophenone. With a 2-fold excess of air (over the above amt.) the yield of cymene drops still lower, and all H_2 is consumed in formation of H_2O . Thus air represses the reactions of irreversible catalysis and favors the purely dehydrogenative reactions.

G. M. Kosolapoff

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RAFikov, S. R.

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✓ Oxidation of organic compounds. VIII. Catalytic transformations of dipentene in the presence of vanadium oxides. B. V. Suvorov, S. R. Rafikov, and L. K. Tuturova. *Izvest. Akad. Nauk Kazakh. S.S.R., Ser. Khim.* 1955, No. 8, 133. CH
43 (in Russian); cf. C.A. 46, 11125c; 49, 2122b. — Passage of dipentene over V oxide catalyst in the absence of O or with small amts. of air at 620° results in different products. Without O the products are *p*-cymene, *p*-menthane, *p*-

isopropenyltoluene and H. With air present the products are *p*-isopropenyltoluene and *p*-cymene. Thus the 1st stage in the reaction of dipentene is dehydrogenation to an aromatic intermediate. Analysis of cymene-menthane mixts. can be done by treatment with S-CH₃ (cf. Nametkin, et al., C.A. 32, 6847). G. M. Kesolapoff

(2)

RAF. KOU, S. R.

V Oxidation of organic compounds. XI. Catalytic oxidation of p-cymene in the liquid phase. M. I. Khmura, B. V. Suvorov and S. R. Rafikov (Zh. obshch. Khim. SSSR, 1955, 23, 1418-1423) - A study of

NO. 7.

the mechanism of the oxidation of p-cymene by air in the liquid phase in the presence of Mn, Co and Cu toluates, Mn terephthalates and naphthalenes, MnO₂, and foamed glass, at 170-172°. It is considered that the hydroperoxide of p-cymene is first formed, and that this loses MeOH to give methyl p-tolyl ketone, which in turn oxidises to p-toluic acid and thence to terephthalic acid. The hydroperoxide of acetone also decomposes directly to give acetone and p-cresol, but in small quantities. Alongside the oxidation of p-cymene, a condensation reaction leads to the formation of 1 : 1 : 2 : 2-tetramethyl-1 : 2-di-p-tolyloethane. Reference is made

to the increase in activity of the H-atom of the isopropyl group at higher temp. Up to 110°, preferential attack occurs at the Me group, presumably because the H-atom of the isopropyl group is protected by steric factors; at higher temp. the mobile H of the isopropyl group enjoys greater freedom and reacts preferentially to the Me group. (33 references.) K. F. A. LINTON

(3)

RAFIKOV, S.R.

China/Chemical Technology. Chemical Products and Their Application -- Industrial organic synthesis, I-14

Abst Journal: Referat Zhur - Khimiya, No 2, 1957, 5657

Author: Rafikov

Institution: ~~None~~

Title: Advances in Chemistry and Technology of Primary Organic Synthesis

Original
Publication: Kesyue tunbao, 1956, No 6, 29-39

Abstract: Translation of a paper read in Chinese People's Republic on 14 October 1955.

Card 1/1

~~RAFIKOV, S.R.~~ RAFIKOV, S.R.

5001. OXIDATION OF ORGANIC COMPOUNDS. IX. DETERMINATION OF ACTIVE OXYGEN IN SOLID FUEL. RAFIKOV, S.R. and Bibiryakova, N.Ya. (Izv. Akad. Nauk Kazakh. SSR, Ser. Khim. (Russ. Acad. Sci. Kazakh. S.S.R., Ser. Chem.), 1956, (9), 13-22; abstr. in Chem. Abstr., 1956, vol. 50, 8992). Adsorption of iodine by various coals from aqueous solution was examined; the differences in adsorptive qualities of coal samples make the use of the iodometric method dubious for determination of active peroxide oxygen in coal. This form of oxygen in coal can be determined accurately by topochemical reaction of hydroquinone dissolved in water in which the peroxide groups react with the reagent. The values are expressed as peroxide number which is ml of 0.01 N sodium thiosulfate needed for iodometric determination of quinone formed in the reaction. Temperature, adsorption, surface active substances, and mineral salts can affect the determination of peroxides in coal. The adsorbed oxygen is not determined by the above method.

C.A.

BM

LFH

UPOBOVA, Ye.P.; RAFIKOV, S.R.

Determination of carboxyl and phenol groups in coal. Izv.AN Kazakh.
SSR. Ser.khim.no.9:23-32 '56. (MIRA 9:7)
(Coal--Analysis)

RAFIKOV, S.R.

Oxidation of organic compounds. X. Mechanism of
Processes of autooxidation and spontaneous combustion of
coal. S. R. Rafikov. *Izvest. Akad. Nauk Kazakh S.S.R.*
Ser. Khim. 1966, No. 9, 75-91. cf. C.A. 50, 1676i.—
Review with 35 references. G. M. Kosolapoff

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RAFIKOV, S. R.

Determination of the wax content of crude oil. V. G. Gutsalyuk, N. D. Kazakova, and S. R. Rafeikov. *Izvest. Akad. Nauk Kazakh. S.S.R., Ser. Khim.* 1956, No. 10, 91-5.—The most accurate wax detn. consists in the removal of tars with silica gel, followed by pptn. of solid paraffins with C_6H_6 and $(CH_2Cl)_2$ in the ratio 2:14 and 1:14 per 1 part of sample. The use of these ratios gave results very close to those obtained with C_6H_6 and Me_2CO in the ratio 10:5:1.

G. M. Kosolapoff

Fail

3/

AUTHORS: Tsetlin, B. L., Rafikov, S. R. 62-11-25/29

TITLE: On the effect of X-Radiation on Polyamides (O deystvii rentgenovskogo izlucheniya na poliamidy)

PERIODICAL: Izvestiya AN SSSR, Otdel.Khim.Nauk, 1957, Nr 11, pp.1411-1413 (USSR)

ABSTRACT: Here the effect of a highly intensive X-radiation on polyhexamethylenadipinamide (anide) and polyamide, which forms a product of a mutual polycondensation of the hexamethylenediamine with the azelaic acid, the adipinic acid and caprolactome (anide G-669, reference 2), was investigated. The samples of the anide G-669 were investigated in non-stretched, those of the anide in stretched condition. It is shown that under the radiation influence in the polyamides processes of a radiation vulcanization and such of a crystallization decrease take place. There are 2 figures and 6 references, 5 of which are Slavic.

ASSOCIATION: Institute for Element-Organic Compounds of the AN USSR (Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR)

SUBMITTED: June 19, 1957

AVAILABLE: Library of Congress

Card 1/1

RAFIKOV, S. R.

Cher Catalyst carrier of porous material. L. K. Kovsky, D. V. Sokol'ski, and S. R. Rafikov. U.S.S.R. 104,883, Feb. 25, 1967. The carrier is made of cellular glass to increase its heat resistance and activity. M. Hosh

KAFIKOV, S. R.

Hydrocyanic acid? B. V. Suvorov, S. R. Rafikov, V. S.
Kudinoza, and M. I. Khmura. U.S.S.R. 106,226, July 25,
1957. HCN is obtained by the catalytic oxidation of a
mixture of MeOH and NH₄OH. A mixture of V and Sn oxides
is used as the catalyst. M. Hosh

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4E4j

Rafikov, S. K.

Catalytic production of p-toluic acid. R. V. Savogov,
S. B. Rafikov, and L. G. Manukovskaya. U.S.S.R.
107,178, Aug. 25, 1957. p-Xylene is oxidized with mol. O
in the presence of Co acetate as catalyst to give p-toluic acid.
M. Hoshino

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ITE

RAFIKOV, S. R.

AUTHOR SUVOROV, B.V., RAFIKOV, S.R.,
KUDINOVA, V.S., KHMURA, M.I.,
20-2-31/67

TITLE On the Mechanism of Oxidation Transformations of Methyl Alcohol
Formaldehyde and Formic Acid in the Vapour phase in the Presence
of Tin Vanadate.
(O mekhani zme okislitel'nykh prevrashcheniy meti lovogo spirta
formaldegida i mirav'inoi kisloty v parovoy faze v prisutstvii
vanadata alova

PERIODICAL Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 2, pp 355-357,
(U.S.S.R.)
Received 6/1957 Reviewed 7/1957

ABSTRACT On the occasion of oxidation of alkyl benzols in the vapour phase
on vanadium catalysts a considerable quantity of compounds of re-
latively small molecules develops as by-products. Formaldehyde,
carbon monoxide and -dioxide among them develop the main products.
The formation mechanism and further transformations of these "splin-
ters" are in sufficiently investigated (methanol, formic acid and
others would be expected especially on the occasion of oxidation
of the benzol homologues with an isopropyl group). The present
particulars indicate that the lowest aliphatic alcohols are the
most unsteady ones. Larger quantities of corresponding aldehydes
and products of a complete combustion develop from them by oxida-
tion. The yield of acids is small, allegedly because of its unstea-
diness under these conditions. Oxidation was carried out in a dis-

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On the Mechanism of Oxidation Transformations
of Methyl Alcohol, Formaldehyde and Formic acid in the Vapour
Phase in the Presence of Tin Vanadate.

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20-2-31/67

charge plant (1100 mm length, 21 mm of diameter). The results of experiments with methanol showed that it completely enters into the reaction already at a temperature of 310° . The main products were: formaldehyde and carbon monoxide, the latter obviously as decomposition product of formaldehyde. This is confirmed by the results of the oxidation of formaldehyde itself. Moreover, illustration 1 shows that, on the occasion of formic acid, up to 40% CO_2 develop whereas in the case of methanol and formaldehyde its share does not exceed 10%. This demonstrated that formic acid cannot be looked upon as necessary by-product of a complete oxidation of methanol and formaldehyde. Obviously here the reaction proceeds in several directions. Also the residual oxidation of carbon monoxide is here out of the question as the reaction of tin vanadate at a temperature of 410° proceeds only slowly. According to the peroxide- and chain-theory it is possible to suppose a general scheme of oxidation of methanol (and formaldehyde) (reaction II) based on the results obtained. For the purpose of an additional testing of this scheme, it was interesting to investigate the oxidation of methanol under comparable conditions, however under presence of ammonia. As expected up to 90% cyano-hy-

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On the Mechanism of Oxidation Transformations ~~XXXXXXXXXX~~
of Methyl Alcohol, Formaldehyde and Formic Acid in the Vapour
Phase in the Presence of Tin Vundate.

20-2-31/67

drogen developed on this occasion, probably by formamide. Ammonia (3-5 g per 1 g initial matter) did not effect any essential modifications of the HCN. CO does not react with ammonia at the experimental temperature either. It is characteristic that on the occasion of interaction between formic acid and ammonia under similar conditions the HCN-yield does not exceed 50%. So the high HCN- yield cannot be caused by the intermediate formation of formic acid. The results of these latter experiments thus confirm (under the given experimental conditions) the above transformations of methanol and formaldehyde following each other.
(2 illustrations, 16 citations from publications)

ASSOCIATION Institute for Chemical Science of the Academy of Science of the
U.S.S.R.
PRESENTED BY ARBUZOV, B.A., Member of the Academy.
SUBMITTED 29.9.1956
AVAILABLE Library of Congress.
Card 3/3

INDEXED, PA

AUTHOR SUVOROV B.V., RAFIKOV S., SOLOMIN A.V. and PA - 3162
KHMURA M.I.

TITLE On Vapor Phase Oxidation of Styrene and α -Methylstyrene on
Tin Vanadate.
(O parofaznom okislenii stirola i α -metilstirola na vanadate
olova.- Russian)

PERIODICAL Doklady Akademii Nauk SSSR 1957, Vol 113, Nr 3, pp 624-626
(U.S.S.R.)

ABSTRACT Received: 7/1957 Reviewed: 8/1957
From the experimental results shown in two tables it appears
that the yield of the single oxidation-products of each
initial-substance depends on the temperature of the reaction:
an increase of the latter advances a gradual destruction of
the carbon-skeleton of the compound to be oxidized. In the
case of experiments carried out at relatively low temperature
carbonyl-compounds with unchanged aromatic ring and benzoic
acid predominated among the products of the reaction.
With rising temperature its yield is reduced and the quantity
of chinone and maleinanhydride increases. The quantity of low-
molecularproducts of the complete and uncomplete oxidation is
a very characteristic index. From the obtained data it appears
that the total quantity of formaldehyde, CO and CO₂ at low

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PA - 3:29

On Vapor Phase Oxidation of Styrene and α -Methylstyrene on Tin Vanadate.

temperatures does not surpass 1.25 mol per mol of the oxidized carbon. This points to the fact that the low-molecular-products chiefly occur at the cost of the burning away of the lateral groups. The results obtained give rise to the assumption that the oxidation of the styrene and the α -methylstyrene in the vapour phase with tin vanadate in the primary phases takes place in the same direction as the oxidation in the condensation-phase with or without catalyzers. In the case of styrene a thermal decay with formation of benzaldehyde and formaldehyde is probable, and in the case of methylstyrene a thermal decay with formation of acetophenone and formaldehyde. Experimental results confirm this assumption. At higher temperatures no acetophenone or benzaldehyde could be detected in the reaction-products.

(2 tables and 3 citations from Slavic publications.)

ASSOCIATION: Institute for Chemical Science of the Academy of Science of the Kasakstan SSR.

PRESENTED BY: Arbuzov B.A., 3.10. 1956.

SUBMITTED: 29.9. 1956.

AVAILABLE: Library of Congress.

CARD 2/2

KORSHAK, Vasil'y Vladimirovich; VINOGRADOVA, Svetlana Vasil'yevna;
RAFIKOV, S.R., doktor khim.nauk; BANKVITSER, red. izd-va;
KUZ'MIN, I.F., tekhn.red.; KASHINA, P.S., tekhn.red.

[Heterogeneous chain polyesters] Geterotsepnnye poliefiry.
Moskva, Izd-vo Akad. nauk SSSR, 1958. 403 p. (MIRA 11:12)
(Esters)

MAKAREVICH, V.G.; SUVOROV, B.V.; RAFIKOV, S.R.

Oxidation of organic compounds. Liquid phase oxidation of α -pinene by
molecular oxygen in the presence of inhibitors. Part 13. Izv. AN Ka-
zakh. SSR. Ser.khim. no.1:79-83 '58. (MIRA 12:2)
(Pinene) (Oxidation)

RAF-1-00, S.R.

66358

SOV/81-59-19-68673

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Translation from: Referativnyi zhurnal. Khimiya, 1959, Nr 19, pp 310 - 311 (USSR)

AUTHORS: Solomin, A.V., Suvorov, B.V., Rafikov, S.R.

TITLE: The Oxidation of Organic Compounds. Communication XVI. On the Effect of the Structure of the Side Chain on the Vapor-Phase Oxidation of Monoalkylbenzenes in the Presence of Vanadium Catalysts

PERIODICAL: Tr. In-ta khim. nauk. AN KazSSR, 1958, Nr 2, pp 182 - 187

ABSTRACT: The vapor-phase oxidation has been studied of toluene (I), ethylbenzene (II), cumene (III), α -methylstyrene (IV) and styrene (V) by moistened air in the presence of $\text{Sn}(\text{VO}_3)_4$ (VI), the alloy $\text{V}_2\text{O}_5 : \text{SnO}_2$ 1:1 (VII) and $\text{V}_2\text{O}_5 : \text{MoO}_3 : \text{P}_2\text{O}_5$ (1:0.34:0.003) (VIII). The experiments are carried out at a temperature of 300 - 400°C, the time of contact 0.1 - 0.3 sec, the weight ratio of the oxidized substance to air 1:75-1:85, and the supply rate of the initial substance and water 5-6 g/hr and 100 - 105 g/hr respectively. The quantity of the side reactions depends on the structure of the initial alkylbenzene and on the conditions of the process conducted. At the oxidation of I and III over IV at a temperature $> 340^\circ\text{C}$ principally $\text{C}_6\text{H}_5\text{COOH}$ (IX), maleic

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SOV/81-59-19-68673

The Oxidation of Organic Compounds. Communication XVI. On the Effect of the Structure of the Side Chain on the Vapor-Phase Oxidation of Monoalkylbenzenes in the Presence of Vanadium Catalysts

anhydride (X) and a small quantity of quinone are formed. At a temperature $\leq 340^{\circ}\text{C}$, besides IX and X 3-5% benzaldehyde is formed from I and 3-5% acetophenone from III. The oxidation of I, II and III over IV, and of II and III over VIII proceeds in an analogous way to the oxidation over VI, but the optimum conditions lie in the region of higher temperatures. In all experiments the presence of phenol, hydroquinone and formaldehyde has been proved. VIII is inactive in the reaction of the oxidation of I. The oxidation of IV and V proceeds analogously to the oxidation of monoalkylbenzenes. A diagram of the reaction and its possible trends, depending on the intermediate products, has been proposed. Communication XV see RZhKhim, 1959, Nr 11, 3957C.

T. Sladkova

4

Card 2/2

MANUKOVSKAYA, L.G.; SUVOROV, B.V.; RAFIKOV, S.R.

Oxidation of organic compounds. Report No.17: Autoxidation of
n-butyraldehyde, benzaldehyde and p-tolualdehyde. Trudy Inst.
khim.nauk AN Kazakh. SSR 2:188-196 '58. (MIRA 12:2)
(Oxidation) (Aldehydes)

KAZAKOVA, N.D.; GUTSALYUK, V.G.; RAFIKOV, S.R.

Extractive crystallization with urea as a method for quantitative
determination of n-hydrocarbons in petroleum paraffins. Trudy Inst.
khim.nauk AN Kazakh. SSR 2:210-217 '58. (MIRA 12:2)
(Hydrocarbons) (Crystallization)

AUTHORS: Solomin, A. V., Saverov, B. V., Rafikov, S.R. 79-1-25/63

TITLE: The Oxidation of Organic Compounds (Oksleniye organicheskikh soedineniy). XV. On the Oxidation of Ethyl Benzene in the Vapor-Phase State Over Tin Vanadate (XV. O parofaznom okslenii etilbenzola na vanadate olova).

PERIODICAL: Zhurnal Obshchey Khimii, 1958, Vol. 28, Nr 1, pp. 133-138 (USSR).

ABSTRACT: The oxidation of alkyl benzenes with a secondary α -carbon atom in the vapor-phase state had not been sufficiently investigated. Only one paper had been published on this subject in which it is pointed out that on passage of ethylbenzene vapors in a mixture with air only benzoic acid is formed. The yield at 270-280° C amounted to 4%. The aim of the present paper was an exact investigation of the fundamental rules governing this reaction, special attention in the oxidation being paid to the intermediate and final products. Some of the intermediate products were oxidized under equal conditions. The obtained experimental results show that the vapor-phase oxidation of ethylbenzene with air takes a very complicated course and according to the prevailing conditions leads to

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The Oxidation of Organic Compounds. XV. On the Oxidation of
Ethyl Benzene in the Vapor-Phase State Over Tin Vanadate.

77-1-25/15

the formation of different oxygen-containing compounds. Thus the authors beside benzoic acid also found benzaldehyde, acetophenone, quinone, maleic anhydride, CO and CO₂ and quantitatively determined their amounts. The dependence of the yield of some of the enumerated reaction products on temperature is represented in diagram.1. A scheme of the fundamental direction of the vapor-phase oxidation of ethylbenzene over tin vanadate was suggested which is based on the data of the peroxide theory and on the theory of the radical-chain processes. The assumption was uttered that the oxidation of ethylbenzene might simultaneously proceed in several parallel directions, in main as well as in side directions. Each of those represents a multistage process of a gradual decomposition of the carbon skeleton, with a subsequent formation of a large number of by-products. The final stage of each of these directions consists of the formation of products of the completed oxidation. There are 5 figures and 12 references, 10 of which are Slavic.

ASSOCIATION: Institute for Chemical Sciences AN Kazakh SSR (Institut
Card 2/3 khimicheskikh nauk Akademii nauk Kazakhskoy SSR).

The Oxidation of Organic Compounds. XV. On the Oxidation of
Ethyl Benzene in the Vapor-Phase State Over Tin Vanadate.

79-1-28/63

SUBMITTED: December 3, 1956

AVAILABLE: Library of Congress

Card 3/3

1. Chemistry 2. Organic compounds-Oxidation

5(4)

AUTHORS: Pavlova, S. A., Rafikov, S. R., SOV/20-123-1-34/56
Tsetlin, B. L.

TITLE: On the Regularities of the Radiation Vulcanization of Polyamides
(O zakonomernostyakh radiatsionnoy vulkanizatsii poliamidov)
By Means of the Samples of Anid G-669 (Na primera anida G-669)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 1, pp 127-130
(USSR)

ABSTRACT: The present paper deals with the procuring of experimental proof of the reactions of the destruction and structural formation by the action of an ionizing radiation upon polyamides. The soluble mixed polyamide "Anid G -669", which is produced by polycondensation of hexamethylene diamine with adipic acid and mitazelaic acid as well as with caprolactate, was used as experimental object. The samples of 1 mm thickness of "Anid G -669" were irradiated for 1 - 20 hours in air and also in a vacuum. An X-ray tube of the type TRB -3 was used as radiation source. A diagram shows the thermomechanical curves of the compression of the samples of "Anid G -669" as a function of the dose. Already after three hours of irradiation a fraction, which is insoluble in acetic acid (7 percents of weight), occurs,

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On the Regularities of the Radiation Vulcanization
of Polyamides. By Means of the Samples of Anid G-669

SOV/20-123-1-34/56

the portion of which increases to 76% after being irradiated for 10 hours. The second diagram shows the dependence of the viscosity of the solutions on their concentration for "Anid G -669" in creosol and in acetic acid. As a result of irradiation, the viscosity for creosol solutions decreases and it increases for solutions in acetic acid. Two further diagrams show the results obtained by the turbidimetric titration of non-irradiated and irradiated "Anid G -669" in form of integral and differential distribution curves (with respect to solubility). The maximum of the original differential distribution curve divides into a double maximum as a result of irradiation. The distance between the two maxima increases with an increase of the dose. If the dose is larger than that corresponding to the forming of a yellow color, the differential distribution curves correspond to the distribution over solubility within the brine fraction. The experimental data obtained by the present paper show the following: Under the influence of irradiation processes of production of transversal bonds and of the destruction of the main chains of the macromolecules take place in the polyamide.

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On the Regularities of the Radiation Vulcanization
of Polyamides . By Means of the Samples of Anid G-669

SOV/20-123-1-34/56

A complex investigation of the change of the mechanical properties and of the properties of the solutions, as well as of the distribution function with respect to molecular weights makes it possible to give a sufficiently complete estimate of the change of the molecular structure of polyamides during their radiation-chemical transformation. Apparently, the application of similar investigation methods makes it possible to separate the parallel reactions of structural formation and of the destruction of polymers of different structures. There are 4 figures and 8 references, 5 of which are Soviet.

PRESENTED: June 25, 1958, by V. A. Kargin, Academician

SUBMITTED: June 23, 1958

Card 3/3

15(8)

PHASE I BOOK EXPLOITATION

SOV/2419

Rafikov, Sagid Raufovich, Professor

Plastmassy (Plastics) 2d ed., enl. Moscow, Fizmatgiz, 1959. 69 p.
(Series: Nauchno-populyarnaya biblioteka, vyp. 42) 75,000 copies
printed.

Ed.: V.A. Mezentsev; Tech. Ed.: V.N. Kryuchkova.

PURPOSE: The booklet is intended for the general reader.

COVERAGE: The booklet discusses the characteristics and uses of various types of plastic materials. Emphasis is placed on light weight, resistance to alkalies, acids, sea water, etc. The application of plastics in construction, in the manufacture of chemical apparatus, in surgery and electrical engineering is discussed. More than 100,000 parts of the "TU-104" airplane are made of plastics. In agriculture plastics are used for manufacturing parts of farm machinery, in hothouses, films for reducing the drying out of the soil and for protecting young plants against cloudbursts and

Card 1/2

Plastics

SOV/2419

hail. The use of insulating plastics, foam plastics, glass-reinforced plastics, textile fiber-reinforced plastics, vibration absorbing plastics, and ionites is covered. No personalities are mentioned. There are 17 references, all Soviet.

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1. What is a Plastic?	13
2. Dwarf Molecules and Giant Molecules	20
3. How Plastic and Synthetic Resins Were Developed	31
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AVAILABLE: Library of Congress	

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A005/A001

//, 1100

Translation from: Referativnyy zhurnal, Khimiya, 1960, No.21, p. 47, # 83966

AUTHORS: Rafikov, S. R., Suvorov, B. V.

TITLE: On the Problem of the Mechanism of Inhibitor Action on the Oxidation by Molecular Oxygen

PERIODICAL: V sb.: Okisleniye uglevodorodov v zhidkoy faze. Moscow, AN SSSR, 1959, pp. 94-100

TEXT: At the oxidation of cyclohexene (at 40°C), additions of 0.1% hydroquinone, 0.05% phenol, 0.05% n-aminophenol, 0.025% n-phenylene diamine, 0.6% aniline, 0.05% diphenyl amine, added at the beginning of the process, give rise to an induction period of 5-7 hours duration; additions introduced during the reaction process decelerate the process when 2-11% hydrogen peroxide are accumulated in the system. At the oxidation of $C_6H_5C_2H_5$ (at 50°C) in the presence of hydroquinone, the latter is converted into quinone during the induction period. At 50-180°C, O_2 does not oxidize essentially hydroquinone, phenol, and pyrogallol. H_2SO_4 (0.05%) strongly inhibits the oxidation of i-propylbenzene and benzaldehyde,

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A005/A001

On the Problem of the Mechanism of Inhibitor Action on the Oxidation by Molecular Oxygen

in the authors' opinion, in consequence of the formation of phenol at the interaction of H_2SO_4 with the hydrogen peroxide of 1-propylbenzene. The action mechanism of inhibitors of different chemical nature is discussed.

R. Milyutinskaya

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

26
RAFIKOV, S.R.; SUVCHOV, B.V.; KAGARLITSKIY, A.D.

Dehydrogenation of benzylamine on titanium vanadate under conditions
of oxidative ammonolysis. Izv. AN Kazakh. SSR, Ser. khim. no. 1: 77-79
'59. (MIRA 13:6)

(Benzylamine) (Dehydrogenation) (Titanium vanadate)

SUVOROV, B.V.; RAFIKOV, S.R.; KHMURA, M.I.

Oxidation of organic compounds. Report No.23: Vapor phase catalytic
oxidation of P-cymene by humid air. Izv.AK Kazakh.SSR.Ser.khim.
no.1:80-84 '59. (MIRA 13:6)
(Cymene)

PEL'BAUM, Kh.I.; GURSALYUK, V.G.; RAFIKOV, S.R.

Influence of the residues of thermal cracking on the viscous properties of lubricating oils. Izv.AN Kazakh.SSR.Ser.khim. no.1:95-106 '99.
(MIRA 13:6)

(Lubrication and lubricants)

KOSTROMIN, A.S.; KUDINOVA, V.S.; RAFIKOV, S.R.; SUVOROV, B.V.; KHOURA, M.I.

Oxidation of organic compounds. Report No. 20: Effect of
water addition on catalytic oxidation of aromatic compounds
in the gaseous phase. Izv.AN Kazakh.SSR.Ser.khim. no.2:56-
61 '59. (MIRA 12:8)

(Aromatic compounds) (Oxidation)

MAIPIKOVSKAYA, L.G.; RAFIKOV, S.R.; SUVOROV, B.V.

Oxidation of organic compounds. Report No. 21: Liquid-phase catalytic oxidation of n-toluic acid and some of its derivatives by molecular oxygen. Izv.AN Kazakh.SSd.Ser.khim. no.2: 62-67 '59. (MIRA 12:8)

(Toluic acid)

(Oxidation)

GUTSALYUK, V.G.; RAFIKOV, S.R.; BAYARSTANOVA, Zh.Zh.

Production of plastics on the basis of oxidized bituminous
petroleum residues. Izv.AN Kazakh.SSR.Ser.khim. no.2:72-
78 '59. (MIRA 12:8)

(Plastics) (Petroleum waste)

KARASILEVSKIY, A.I.; GUTSALYUK, V.G.; RAPIKOV, S.R.

Investigating the residues of thermal cracking. Izv. AN Kazakh.
SSR. Ser. khim. no. 2: 102-110 '59. (MIRA 12:8)
(Cracking process)

ROZHKOV, A.M.; RAFIKOV, S.R.; ANUCHINA, I.G.

Copolymerization of dipentene and acrylonitrile. Izv.Sib.otd.
AN SSSR no.5:48-54 '59. (MIRA 12:10)

1. Khimiko-metallurgicheskiy institut Sibirskogo otdeleniya
Akademii nauk SSSR.
(Acrylonitrile) (Dipentene)

RAFIKOV, S.R.; CHELMOKOVA, G.N.; GRIBKOVA, P.N.

Chemical conversions of polymers. Part 2: Polyoxyethylation of polyamides. Vysokom. soed. 1 no.3:378-386 Mr '59.

(MIRA 12:10)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
(Amides)

PAVLOVA, S.A.; RAFIKOV, S.R.

Effect of the structure of polymers on the properties of solutions.
Part 1: Viscosity of solutions and molecular weight of mixed polyamides.
Vysokom. soed. 1 no.3:387-394 Mr '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
(Amides)

RAFIKOV, S.R.; PAVLOVA, S.A.; TVERDOKHLEBOVA, I.I.

Effect of the structure of polymers. Part 2: Use of precision ebullioscopy in the determination of the molecular weight of polyaluminum organic siloxanes. Vysokom. soed. 1 no.3:400-403 Mr '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Molecular weights) (Siloxanes)

RAFIKOV, S.R.; SOROKINA, R.A.

Chemical transformations of polymers. Part 3: Thermal decomposition of polyamides. Vysokom.sped. 1 no.4:549-557 Ap '59.
(MIRA 12:9)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
(Amides)

PAVLOVA, S.A.; RAFIKOV, S.R.

Correlation between the viscosity of solutions and the molecular weight of polymers. Vysokom.sped. 1 no.4:623-626 Ap '59.
(MIRA 12:9)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Polymers) (Molecular weights)

RAFIKOV, S.R.

Viscometer for determining the viscosity of solutions of
high molecular weight compounds. *Vysokom.sped.* 1 no.10:
1558-1560 0 '59. (MIRA 13:3)

1. Institut elementoorganicheskiy AN SSSR.
(Viscosimeter)

SOV/153-2-4-27/32

3(1,3)
 AUTHORS: Savorov, B. V., Rafikov, S. R., Khmura, M. I., Kudinova, V. S., Kostromin, A. S.

TITLE: Direct Synthesis of Dinitriles of the Aromatic Sequence From Dialkyl Benzenes and Terpene Hydrocarbons

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i Khimicheskaya tekhnologiya, 1959, Vol 2, Nr 4, pp 614 - 618 (USSR)

ABSTRACT: Aromatic dinitriles are promising raw materials for the production of phthalic acids and diamines of the aliphatic-aromatic and alicyclic sequence. These again are the initial products for the production of polyesters and polyamides (Ref 1). The latter, however, can be directly obtained from dinitriles by their interaction with secondary and tertiary highly molecular alcohols (Ref 2). Hence the great interest in the new ways of producing dinitriles of various structures. After giving a survey of publications (Refs 3,4) the authors state that they have been dealing with the catalytic ammonolysis of organic compounds for years (Refs 5-7). With regard to their task of synthesizing dinitriles they pay special attention to the ammonolysis of dialkyl benzenes especially in the presence of air. The apparatus

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Direct Synthesis of Dinitriles of the Aromatic Sequence SOV/153-2-4-27/32
From Dialkyl Benzenes and Terpene Hydrocarbons

used for this purpose is filled with a granulated catalyst. Mixed catalysts of oxides of vanadium, tin, titanium, and some other elements with varying valence proved to be most effective. p-Xylene is the most accessible and promising raw material in the synthesis of dinitrile of terephthalic acid. Hence its transformations were investigated most thoroughly. Figure 1 shows the qualitative composition and the quantitative conditions of the reaction products of a characteristic experimental series. Hence it appears that oxidative ammonolysis yields a very complicated scale of substances. The main products, however, are the dinitrile and p-tolunitrile required. The composition of the reaction products greatly depends on the reaction conditions. The process can be directed to the special formation of any product by the choice of the respective reaction products. The structure of the initial product is also of importance. In addition to p-xylene, other p-dialkyl benzenes as well as hydroaromatic and terpene hydrocarbons underwent the reaction mentioned. All of them yielded terephthalic-acid dinitrile, and may thus be considered a source of reserve raw materials. Dinitriles of isophthalic and o-phthalic acid are

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Direct Synth is of Dinitriles of the Aromatic Sequence SOV/153-2-4-27/32
From Dialkyl Benzenes and Terpene Hydrocarbons

very interesting. In addition to xylene diamines (for the production of high-melting, fiber-forming polyamides), other valuable compounds can be obtained: orthoisomer (for phthalocyanine dyes (Ref 9), for refractory varnishes and glasses). Their yield exceeded 50%. The ammonolysis mentioned can also take place without oxygen (Ref 3), but the yield of dinitriles remains small (5-10%) (Fig 2). Aromatic aldehydes and acids react readily with ammonia under similar conditions and give nitrile yields close to theoretical ones (Ref 10). A report on the above work was given at the All-Union Conference on "Ways of Synthesis of Initial Products for the Production of High Polymers" which took place in Moscow from September 29 to October 2, 1958. There are 2 figures and 11 references, 8 of which are Soviet.

ASSOCIATION: Institut khimicheskikh nauk AN KazSSR (Institute of Chemical Sciences of the Academy of Sciences, Kazakh SSR)

Card 3/3

SOV/79-29-1-35/74

AUTHORS: Manukovskaya, L. G., Suverov, B. V., Rafikov, S. R.

TITLE: Oxidation of Organic Compounds (Okisleniye organicheskikh soyedineniy) XIX. On the Catalytic Oxidation of p-Xylene With Molecular Oxygen in the Liquid Phase (XIX. O zhidkofaznom kataliticheskom okislenii p-ksilola molekulyarnym kislorodom)

PERIODICAL: Zhurnal obshchey khimii, 1959, Vol 29, Nr 1, pp 158-165 (USSR)

ABSTRACT: The oxidation of the alkyl benzenes with molecular oxygen is one of the most comfortable syntheses of noble oxygen-containing aromatic compounds. At present, acetophenone and methyl-phenyl carbinol are thus obtained from ethyl benzene (Ref 1), as well as the hydrogen peroxide of cumene from cumene (Ref 2), the p-tertiary butylbenzoic acid from p-tertiary butyl toluene (Ref 3), etc. In the last years many similar methods of synthesizing the terephthalic acid from p-xylene were devised from among which that having four stages (Ref 4) proved to be the cheapest. Although many scientists investigated the catalytic oxidation in the liquid phase (Refs 5-8) and described the technological scheme of the process in publications (Ref 4), some questions regarding the reaction mechanism re-

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SOV/79-29-1-35/74

Oxidation of Organic Compounds. XIX. On the Catalytic Oxidation of p-Xylene
With Molecular Oxygen in the Liquid Phase

mained unsolved, e. g. that on the nature of the catalytic action, on the dependence of the reaction rate and the yield of oxidation products on various concentrations as well as the question of the nature and succession of the transformation of the p-xylene itself based on oxidation, etc. The solution of some of these problems was the purpose of this paper. It was established that the oxidation of p-xylene without catalyst proceeds very slowly, wherein also the aromatic acids are formed in negligible quantities only. In the presence of cobalt acetate below 130° the oxidation proceeds at a very low rate as well. For this reason, all following experiments with the catalyst were carried out at 133-135°. Thus, the oxidation of p-xylene with molecular oxygen in the presence of cobalt acetate in the liquid phase was investigated, p-toluic and terephthalic acid resulting as the main products. In figure 1 the results of two experimental series with 0.1 and 1% cobalt acetate are presented in order to determine the influence exerted by the duration of the experiment upon the oxidation of p-xylene. Figure 3 illustrates the dependence of the yield of the main oxidation products of p-xylene on the concentration

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SOV/79-29-1-35/74

Oxidation of Organic Compounds. XIX. On the Catalytic Oxidation of p-Xylene With Molecular Oxygen in the Liquid Phase

of the catalyst. There are 5 figures, 1 table, and 21 references, 14 of which are Soviet.

ASSOCIATION: Institut khimicheskikh nauk Akademii nauk Kazakhskoy SSR
(Institute of Chemical Sciences of the Academy of Sciences
Kazakhskaya SSR)

SUBMITTED: December 11, 1957

0.00 3/3

AUTHORS:

SOV/79-29-1-34/74
Kagarlitskiy, A. D., Suvorov, B. V., Rafikov, S. R.

TITLE:

On the Reaction of Acetophenone With Gaseous Ammonia Over
Titanium Vanadate (O reaktsii vzaimodeystviya atsetofenona s
ammiakom v gazovoy faze na vanadate titana)

PERIODICAL:

Zhurnal obshchey khimii, 1959, Vol 29, Nr 1, pp 157-158 (USSR)

ABSTRACT:

On the basis of the synthesis of the trimethyl pyridine from acetone and ammonia according to Chichibabin (Ref 1) it could be expected that in the ammonolysis of acetophenone a 2,4,6-triphenyl pyridine were formed. It was the objective of the present paper to prove that this reaction can really take place. Molten titanium vanadate was chosen as a catalyst which, as previously established (Ref 7), has no bad dehydrating qualities. Already the first ammonolysis experiments of acetophenone have shown that in this case really 2,4,6-triphenyl pyridine results as the main product. This was obtained under optimum conditions at 370-380° in a 35% yield, referred to the transmitted, and in a 98% yield referred to the acetophenone reacted which may easily be seen from the diagram. At 400° and more the yield decreased as crack reactions took place

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SOV/79-29-1-34/74

On the Reaction of Acetophenone With Gaseous Ammonia Over Titanium Vanadate

under the formation of low-molecular products. In the experiments performed below 350° the resinous products were separated on the surface of the catalyst, whereby its activity was reduced. It was however possible to restore its activity in the air current at 400° . The catalyst was made by melting titanium dioxide with vanadium pentoxide according to the formula $Ti(VO_3)_4$. There are 1 figure and 9 references, 5 of which are Soviet.

ASSOCIATION: Institut khimicheskikh nauk Akademii nauk Kazakhskoy SSR
(Institute of Chemical Sciences of the Academy of Sciences,
Kazakhskaya SSR)

SUBMITTED: November 22, 1957

Card 2/2

5(4)

AUTHORS:

Tsetlin, B. L., Sergeyev, V. A., SOV/20-126-1-33/62
Rafikov, S. R., Korshak, V. V., Corresponding Member AS USSR,
Glazunova, P. Ya., Bubis, L. D.

TITLE:

The After-effect in the Irradiation of Methylmethacrylate in
the Presence of Oxygen (Effekt posledeystviya pri obluchenii
metilmetakrilata v prisutstvii kisloroda)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 1, pp 123-125
(USSR)

ABSTRACT:

It is a known fact that oxygen inhibits the radical polymeriza-
tion of many vinyl monomers. This is the case also with
radiation polymerization (Ref 1). However, the irradiated
monomer is able to polymerize later, as soon as the supply
of oxygen is interrupted (Ref 2). This manner of utilizing
ionization energy is of practical interest. The authors
investigated the basic rules of this process. The monomer
was irradiated with fast electrons (900 kev) in an acceler-
ator of the second Institute mentioned under Association.
Figure 1 shows the kinetic polymerization curve in dependence
on the radiation dose R. The initial velocity V_0 of polymer-
ization is, as figure 2 shows, proportional to $R^{1/2}$.

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The After-effect in the Irradiation of Methylmethacrylate in the Presence of Oxygen

SOV/20-126-1-33/62

Figure 3 shows the influence exercised by temperature upon V_0 . Polymerization was introduced by evacuation. The activation energy was calculated as amounting to 11.2 kcal/mol. It is thus considerably lower than the activation energy in the polymerization of methyl methacrylate with benzoyl peroxide, which amounts to 19.7 kcal/mol. The high activity of the peroxide groups formed by irradiation facilitates polymerization at low temperatures. Figure 4 shows the development of polymerization by irradiation, and, as a comparison, the effect of 0.01 % benzoyl peroxide. Apart from the low reaction temperature, irradiation offers the further advantage that, after irradiation, polymerization may be begun at any desired point of time. There are 4 figures and 9 references, 5 of which are Soviet.

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The After-effect in the Irradiation of Methyl-
methacrylate in the Presence of Oxygen

SOV/20-126-1-33/62

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk
SSSR (Institute of Elemental-organic Compounds of the Academy
of Sciences, USSR). Institut fizicheskoy khimii Akademii
nauk SSSR (Institute of Physical Chemistry of the Academy of
Sciences, USSR)

SUBMITTED: February 25, 1959

Card 3/3

SOV/80-32-2-27/56

AUTHORS: Kagarlitskiy, A.D., Suvorov, B.V., Rafikov, S.R.

TITLE: Ammonolysis of Benzaldehyde on Mixed Oxide Catalysts
(Ammonoliz benzal'degida na smeshannykh okisnykh katalizatorakh)

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol XXXII, Nr 2,
pp 388-391 (USSR)

ABSTRACT: During the interaction of benzaldehyde with ammonia in the
presence of titanium vanadate and tin vanadate benzonitrile is
formed with an output of 87 - 88%. Lophine is produced in
small amounts by a side reaction. Another side reaction is
the hydration of benzaldehyde to toluene.
There is 1 graph and 11 references, 2 of which are Soviet,
6 American, 2 English, and 1 German.

ASSOCIATION: Institut Khimicheskikh nauk Akademii nauk KazSSR (Institute of
Chemical Sciences of the Academy of Sciences of the Kazakh SSR)

SUBMITTED: June 12, 1957

Card 1/1

5 (3)

AUTHORS:

Refikov, S.R., Suvorov, B. V.,
Zhubanov, B. A., Khmura, M. I.,
Prokof'yeva, M. V.

SOV/20-126-6-39/67

TITLE:

Synthesis of Nicotinic Acid and Its Amides by Way of Nicotino-
-nitrile (Sintez nikotinovoy kisloty i yeye amida cherez
nikotinonitril)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 6, pp 1286 -1288
(USSR)

ABSTRACT:

In spite of an increasing demand of the substances mentioned
in the title (Refs 1,2) the methods of production applied, give
only low yields (Refs 3-5). The authors produced these two sub-
stances by saponification of nicotinic acid nitrile which is
formed in high yields in an oxidative ammonolysis of the β -pic-
oline on vanadium catalysts (Refs 6,7). β -picoline was isolated
from the corresponding industrially produced fraction. The men-
tioned ammonolysis was carried out in a continuous flow appara-
tus. Granulated tin-vanadate served as catalyst, air was used
as oxidizer. Ammonia was introduced into the reaction zone in
the form of a 20% aqueous solution. The duration of contact was
0.2 - 0.6 sec. Nicotino nitrile and the β -picoline which was

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Synthesis of Nicotinic Acid and Its Amides by Way
of Nicotino-nitrile

SOV/20-126-6-39/67

not reacted were extracted by sulphuric ether, the extract was dried over roasted sodium sulphate and fractionated. In the saponification by means of water under pressure (with some drops of water - ammonia) nicotinic acid amide (melting point $129-130^{\circ}$) and nicotinic acid ($232-234^{\circ}$) were formed. Their yield depends on the reaction conditions of saponification. By changing these conditions either the acid or the amide may be obtained with quantitative yields. The duration of contact is without importance in the temperature range investigated for the β -picoline ammonolysis. Figure 1 shows that if the reaction temperature is increased from 310 to 370° the nicotino-nitrile yield is increased. A further temperature increase up to 400° reduces this yield. In this connection the CO_2 formation increases rapidly. It may therefore be assumed that at temperatures $>370^{\circ}$ reactions of an intensive oxidation take place besides the oxidative ammonolysis of β -picoline. Since the maximum yield of nicotino-nitrile (65% of the theoretically computed yield) and the minimum CO_2 formation were attained in the case of a 20-fold ammonia excess the processes of intensive oxidation are

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Synthesis of Nicotinic Acid and Its Amides by Way
of Nicotino-nitrile

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suppressed by ammonia. Thus, the mentioned ammonolysis produces high yields (over 65%) of nicotinic acid or nicotinamide (over 60%) with respect to the initial product. Oxidizers which are shortage goods are not used. Standard apparatus is necessary. There are 1 figure and 9 references, 6 of which are Soviet.

ASSOCIATION: Institut khimicheskikh nauk Akdemii nauk KazSSR (Institute of Chemical Sciences of the Academy of Sciences of the KazakhSSR)

PRESENTED: October 20, 1958, by M. M. Shemyakin, Academician

SUBMITTED: October 23, 1958

Card 3/3

RAFIKOV, S. K.

PHASE I BOOK EXPLOITATION

SOV/4984

International symposium on macromolecular chemistry. Moscow, 1960.

Mezhdunarodnyy simpozium po makromolekulyarnoy khimii SSSR, Moskva, 14-18 iyunya 1960 g.; Doklady i vyvody. I. Avtorferat. Summaries III. (International Symposium on Macromolecular Chemistry Held in Moscow, June 14-18, 1960; Papers and Summaries) Section III. (Moscow, Izd-vo AN SSSR, 1960) 469 p. 55,000 copies printed.

Tech. Ed.: P. S. Kashina.

Sponsoring Agency: The International Union of Pure and Applied Chemistry. Commission on Macromolecular Chemistry.

PURPOSE: This book is intended for chemists interested in polymerization reactions and the synthesis of high molecular compounds.

COVERAGE: This is Section III of a multivolume work containing papers on macromolecular chemistry. The articles in general deal with the kinetics of polymerization reactions, the synthesis of special-purpose polymers, e.g., ion exchange resins, semiconductor materials, etc., methods of catalyzing polymerization reactions, properties and chemical interactions of high molecular materials, and the effects of various factors on polymerization and the degradation of high molecular compounds. No personalities are mentioned. References given follow the articles.

Usanov, Kh. U., U. N. Musayev, and R. S. Tillyayev (USSR). The Radiation Method of Copolymerizing Acrylonitrile with Polystyrene and Perchlorovinyl	170
Rafikov, S. K., G. N. Chelmonskiy, I. V. Zhuravlev, and P. N. Vityukov (USSR). Oxyethylation of Carbochain and Heterochain Polyamides	184
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SOV/31-60-1-6/20

AUTHORS: Suvorov, B.V. and Rafikov, S.R.

TITLE: New Method to Synthesize Diamines and Dibasic Carboxylic Acids for the Production of High Polymers ↑

PERIODICAL: Vestnik Akademii nauk Kazakhskoy SSR, 1960, Nr 1, pp 44-50

ABSTRACT: This is a study - the 25th instalment of the serialized report on the "Oxidation of Organic Compounds" - of oxidizing ammonolysis reaction of aromatic hydrocarbons. In their experiments, which were carried out with the help of M.I. Khmura, V.S. Kudinova, A.S. Kostromin, A.D. Kagarlitskiy, B.A. Zhubanov and M.V. Prokof'yeva, the authors paid special attention to the study of the mechanism of catalytic ammonolysis of alkyl benzenes and the effect of different factors on the yield of nitriles. ↑
The reaction was carried out with an installation of the flow-through type with a metallic reaction tube of 1100 mm in length and an inner diameter of 21 mm. With the aid of dosing devices hydrocarbon, aqueous ammonia solution

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SOV/31-60-1w6/20

New Method to Synthesize Diamines and Dibasic Carboxylic Acids for
the Production of High Polymers

and, in most cases, air were introduced into the upper part of the reactor. The photograph gives the outer aspect of the installation. The reaction tube was filled with granulated catalyzer. During their experiments the authors tested a great number of different catalyzers. The results showed that catalysts of the mixed type, prepared on the basis of oxides of vanadium, tin, titanium and some other elements of changing valency, are most efficient. The basic particulars of the reaction mechanism of oxidizing ammonolysis of aromatic hydrocarbons were particularly ascertained in the experiments with monoalkyl benzenes [Ref 16], which transform into benzonitrile with a nearly theoretical yield. Dinitrile synthesis was studied on such objects as isomeric xylenes, p-cymene, p-diethylene and p-diisopropyl benzene and also on the example of terpene hydrocarbons [Ref 17, 20, 21]. For the synthesis of terephthalic dinitrile by means of

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SOV/31-60-1-6/20

New Method to Synthesize Diamines and Dibasic Carboxylic Acids for
the Production of High Polymers

catalytic ammonolysis of hydrocarbon the authors consider p-xylene as the most easily obtainable and prospective raw material. Its transformation, therefore, under the given conditions was an object of a particularly specified study. The authors investigated within large limits the effect of mutual correlation and volumetric feeding rate of the initial materials, of the time of contact, reaction temperature, catalyzers etc. The data shows that as a result of oxidizing ammonolysis of p-xylene a very great number of different substances will be obtained. The basic products of the reaction, however, are terephthalic dinitrile and p-tolunitrile. In the reaction products terephthalic acid is always present in the form of an ammonium salt. In experiments with comparatively low reaction temperature the formation of p-toluamide and terephthalic diamide can be observed. Gaseous reaction products are carbon monoxide, hydrogen cyanide, carbon

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SOV/31-60-1-6/20

New Method to Synthesize Diamines and Dibasic Carboxylic Acids for
the Production of High Polymers

dioxide. Their yield increases with rising temperature and may be considerable at 430-450⁰ C. In addition to p-xylene a number of other materials (other p-dialkyl benzenes, some hydroaromatic and terpene hydrocarbons) were subjected to oxidizing ammonolysis. The reaction was called so by the authors because the process of nitrile formation develops under the simultaneous action of ammonia and oxygen on the initial substance. There are 1 photograph and 33 references, 30 of which are Soviet and 3 English.

Card 4/4

86321

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S/190/60/002/012/005/019
B017/B055

AUTHORS: Rafikov, S. R., Pavlova, S. A., Tverdokhlebova, I. I.
TITLE: Dependence of Solution Properties on Polymer Structure.
III. Investigation of Solutions of Polydimethyl Siloxanes
PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2. No. 12,
pp. 1786-1793

X

TEXT: The authors studied the solutions of polydimethyl siloxane in chloro benzene and benzene at 20, 30, and 40°C, and in isooctane at 20 and 30°C applying the method of viscous flow, light scattering, sedimentation by ultracentrifugation, and diffusion. Fractional precipitation of polydimethyl siloxane with methanol from its 3% solution in benzene at 20°C yielded six fractions, the molecular weight of which was determined by light scattering. The results are given in Table 1. The viscosity of the polydimethyl siloxane solutions in chloro benzene at 20, 30, and 40°C is represented graphically in Fig. 1. The molecular weight of polydimethyl siloxane was calculated from the relation

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Dependence of Solution Properties on Polymer Structure. III. Investigation of Solutions of Polydimethyl Siloxanes

S/190/60/002/012/005/019
B017/B055

$$M = \frac{S \cdot R \cdot T}{D (1 - v \rho)}$$

where S = sedimentation constant, D = diffusion coefficient, R = gas constant, T = temperature in °K, v = specific partial volume of the polydimethyl siloxane and ρ = its density. The viscosity of polydimethyl siloxane solutions in chloro benzene, benzene and isooctane at 20, 30, and 40°C are shown graphically in Figs. 2 and 3. The viscosity of polydimethyl siloxane solutions in chloro benzene at 20 and 40°C and benzene at 20°C is a linear function of the concentration. By determining the viscosity and molecular weight, the authors obtained the constants K and a of the equation $[\eta] = KM^a$, which gives the relation between the intrinsic viscosity and the molecular weight. In Fig. 4, $\log[\eta]$ is plotted against $\log M$ for polydimethyl siloxane in chloro benzene and benzene. The dependence of $\log K$ on a, as calculated from the general formula

$$K = \frac{21}{m_0} \left(\frac{1}{2500m_0} \right)^a \quad (\text{Ref. 7})$$

is illustrated in Fig. 5. m_0 is the mean

molecular weight of the polymer. The values of K and a for solutions of polydimethyl siloxane in chloro benzene and benzene at 20 - 40°C are

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Dependence of Solution Properties on Polymer Structure. III. Investigation of Solutions of Polydimethyl Siloxanes S/190/60/002/012/005/019 B017/B055

listed in Table 3. The mean distance between the chain ends is described by the relation $(\bar{h}^2)^{1/2} = \alpha(\bar{h}_0^2)^{1/2}$. Fig. 6 represents the function

$(\bar{h}^2)^{1/2} = f(M)^{1/2}$ for chloro benzene solutions of polydimethyl siloxane at 20, 30, and 40°C. From this it follows that the root mean square distances between the chain ends of polydimethyl siloxane in chloro benzene and benzene increase with an increase in temperature. The constant A, which designates the ratio of the hydrodynamic diffusion and viscosity radii of macromolecules, was calculated from the relation

$A = \eta_0 T^{-1} D(M[\eta])^{1/3}$, where η_0 is the viscosity of the solvent in poise, T the temperature in °K, D the diffusion coefficient, M the molecular weight of the polymer and $[\eta]$ the intrinsic viscosity. In the case of the chloro benzene solutions of polydimethyl siloxane, A changes little with temperature variation, i.e. by $2.27 \cdot 10^{-10}$ to $2.8 \cdot 10^{-10}$ erg/degree. The relation between the diffusion coefficient, D, and the molecular weight of the polymer, M, was calculated and expressed as $D = 1.05 \cdot 10^{-4} M^{-0.547}$.

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Dependence of Solution Properties on Polymer S/190/60/002/012/005/019
Structure.. III.. Investigation of Solutions of B017/B055
Polydimethyl Siloxanes

There are 6 figures, 4 tables, and 12 references: 4 Soviet.

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR
(Institute of Elemental Organic Compounds of the Academy of
Sciences USSR)

SUBMITTED: May 12, 1960

Card 4/4

SUVOROV, B.V.; RAFIKOV, S.R.

New method for synthesizing diamines and dibasic carboxylic acids
for the production of high polymers. Vest.AN Kazakh.SSR 16
no.1:44-50 Ja '60. (MIRA 13'5)
(Amines) (Acids) (Ammonolysis)

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SOV/60-33-1-36/49

AUTHORS: Rafikov, S. R., Suvorov, B. V., Makarevich, V. G.

TITLE: The Liquid-Phase Oxidation of Cyclohexene With Molecular Oxygen in the Presence of Inhibitors. Communication XXIV

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol 33, Nr 1, pp 201-209 (USSR)

ABSTRACT: Auto-oxidation of cyclohexene in the presence of phenol, hydroquinone, p-benzoquinone, quinhydrone, dimethyl ether of hydroquinone, p-, and o-aminophenols, p-phenylenediamine, aniline, diphenylamine, and dimethylaniline was investigated. It was established that all the above compounds except dimethyl ether of hydroquinone are inhibitors of the reaction. Antioxidizing properties of the investigated compounds depend on their composition and on the structure. The degree of activity is as follows: phenol < hydroquinone < aminophenol < phenylenediamine > aniline. Dimethylaniline and diphenylamine occupy a place between aniline and

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The Liquid-Phase Oxidation of Cyclohexene
With Molecular Oxygen in the Presence of
Inhibitors. Communication XXIV

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SOV, 80- (3-1-56/49)

p-phenylenediamine. The total antioxidizing effect depends not only on the individual activity of inhibitor, but also on its concentration. Most of the above inhibitors are capable of reacting with hydroperoxide of cyclohexene. The inhibiting action of compounds having phenolic character is connected with the presence of a mobile hydrogen atom of the hydroxyl group. In aromatic amines, not only the hydrogen atoms of the amino group take part in the process, but also, possibly, the unshared electron pair of nitrogen. The results of oxidation are given below in the following figures: (in all figures A = yield of the mentioned products (in %); B = time (in hr); 1 = without inhibitor).

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The Liquid-Phase Oxidation of Cyclohexene
With Molecular Oxygen in the Presence of
Inhibitors. Communication XXIV

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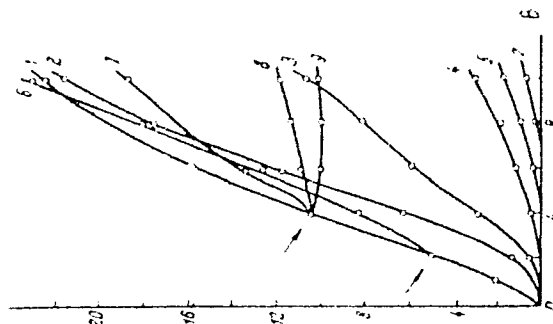


Fig. 1. Oxidation of cyclohexene (I) in the presence of phenol. Amounts are given in % of the corresponding inhibitors. 2 = 0.02, 3 = 0.05; 4 = 0.1, 5 = 0.2; 6 = 0.25; 7 = 0.5; 8 = 5.0, 9 = 10.0.

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The Liquid-Phase Oxidation of Cyclohexene
With Molecular Oxygen in the Presence of
Inhibitors. Communication XXIV

775-7
SOV. TO-13-1-36/49

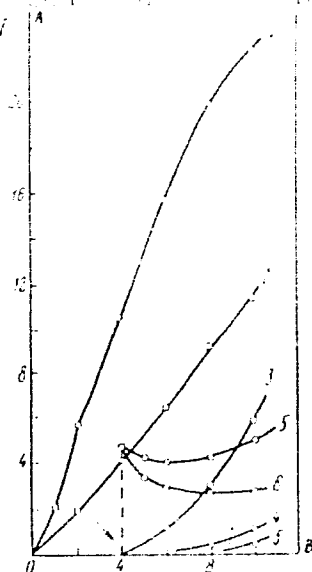


Fig. 2. Oxidation of I in the presence of hydroquinone:
2 = 0.05; 3 = 0.1; 4 = 0.25; 5 = 0.5; 6 = 1.0;
7 = 5.0; 8 = 10.0.

Card 4/12

The Lipid-Binding Capacity of Cells
With Molecular Oxygen Inhibitors.
Inhibitors. Chemicals, Anal.

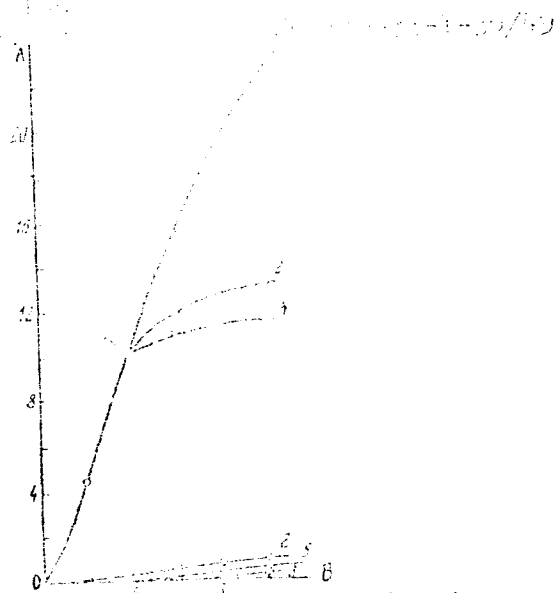


Fig. 3. Oxidation of 1,4-benzoquinone of quinone and quinhydrone: 2 = 0.1; 3 = 1.0; 4 = 1.0; 5 = 0.1, of quinhydrone.

Card 5/12

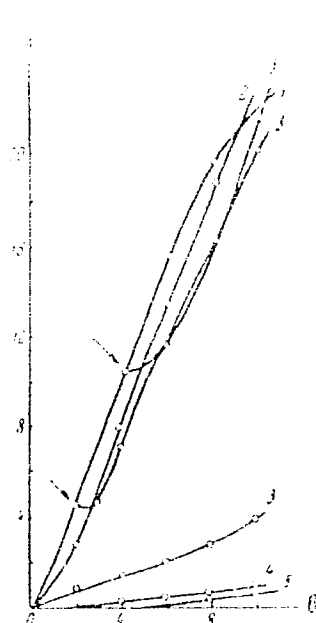


Fig. 4. Calculation of T in the presence of aniline:
 $\beta = 0.1$; $\delta = 0.2$; $\alpha = 0.3$; $\gamma = 0.4$.

Card 6/12

10

CA

High-molecular weight compounds. XXII. Influence of polarity of substituents on polymerizability of substituted ethylenes. V. V. Korshak (Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel Khim. Nauk* 1949, 487-92; cf. C.A. 44, 3951a. —Theoretical review (11 references) and discussion. The polymerizability of substituted ethylenes is directly connected with their dipole moments and the increase of polymerizability is caused by polarization of the C-C link under the influence of the substituent. The dipole values are taken from Syrkun and Dyatkina (*The Chem. Bond and the Structure of Mols.*, 1946 (C.A. 41, 5010b)). The regular structure of the polymers is also explained by the bond polarization. Generally, introduction of polar groups adjacent to a CO group decreases polymerizability by decreasing the polarizability of the CO link. Similar polarization factors are believed to influence the polymerization of such rings as ethylene oxide, ethylenimine, lactones, and lactams.

XXIV. Causes for stoppage of chain growth in polycondensation reactions. V. V. Korshak (Acad. Sci. U.S.S.R., Moscow). *Ibid.* 1950, 47-50. —Discussion, in which it is pointed out that stoppage of chain growth may occur even with strictly stoichiometric proportions of reagents and may be caused by evapn. of 1 of the components, or it may result from termination reactions, such as: decarboxylation, deamination, dehydration, and particularly ring closure at the end of the growing chain.

XXV. Mechanism of linear polycondensation reactions. S. R. Rafikov, V. V. Korshak, and G. N. Chelnokova. *Zhur. Obshchei Khim.* 19, 2100-17; *J. Gen. Chem. U.S.S.R.* 19, No. 11, 2581-9 (1949) (English translation); cf. C.A. 43, 65785. —The distribution of mol. wts. of polyesters from adipic acid and $\text{HOCH}_2\text{CH}_2\text{OH}$ shows a decided max. with an absence of products of higher mol. wts. than 20% above the mean mol. wt.; this is contrary to the theoretical calcns. by

Flory's method (C.A. 30, 7041f; 40, 6881f), which gives a rather flat curve. The mechanism of polyesterification is discussed and it is shown that the basic factor which determines the characteristics of the products is the reversible set of reactions of alcoholysis and acidolysis of the polyesters, either at chain ends or by inter-chain processes. XXVI. One peculiarity of chemical destruction process in compounds of high molecular weight. V. V. Korshak. *Izvest. Akad. Nauk S.S.S.R., Otdel Khim. Nauk* 1950, 51-5. —Discussion of depolymerization processes (16 references) in high-mol. substances. The coeff. of polymerization in a process in which the destruction (i.e. depolymerization) has reached equil. conditions may be treated kinetically if the degree of depolymerization is assumed to be proportional to the concn. of the destructive agent; such coefficients, called, in theoretical cases show that the most profound effect on the av. mol. wt. of the polymer arises from depolymerization of the products of highest mol. wt. in the mixts. and curves for several hypothetical cases are presented. As a result, there is a tendency for the mol. wts. of the mixt. to approach homogeneity, i.e. the coeff. of polydispersity tends toward unity.

G. M. Kosolapoff

RAFIKOV, S.R.

22356-Rafikov, S.R. Raboty A.M. Butlerova V. Oblasti Sinteza I Issledovaniya
Vysokomolekulyarnykh Soyedineniy. Vysokomolekulyar. Soyedineniyakh, Vyp. 9, 1949,
S. 70-75.-Bibliogr: S. 75

SO: Letopis' No. 30 1949

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28

Investigations in the Field of High-Molecular Weight
Compounds. XXV. The Mechanism of Linear Poly-
condensation Reactions. (In Russian) S. R. Radkov,
V. V. Korshak, and G. N. Chelnokova. *Zhurnal Obsh-
chei Khimii* (Journal of General Chemistry) 5, 1981
Nov. 1949, p. 2109-2117.
11 references

RAFIKO., S. R.

TA 25/4917

USSR/Chemistry -- Kinetics
Chemistry -- Esterification

Jan 49

"The Problem of Reaction Kinetics in Polyesterification," S. R. Rafikov, V. V. Korshak, 4 pp

"Dok Ak Nauk SSSR" Vol LXXIV, No 2

Investigates reaction kinetics of polyesterification for the case of interaction of adipic acid with decamethyleneglycol and ethyleneglycol. Concludes that reaction speed of polyesterification will depend not upon chain's length, but upon concentration of free groups capable of reaction. Submitted 7 Oct 48.

25/4917

~~TOP~~

117 AND 118 (1949)
PROCESSING AND PROPERTIES INDEX
140 AND 141 (1949)

C A

Kinetics of the polyamidation reaction. G. N. Chelno- kova, B. K. Maslov, and V. V. Korshak. *Doklady Akad. Nauk S.S.S.R.* 64, 353-4 (1949).—The reaction between sebacic acid and hexamethylenediamine, in *m*-cresol solu- (1:1 by wt. to the amine sebacate), resulting in the for- mation of polyamides of linear structure, according to $nH_2N(R)NH_2 + nHOOC(R')COOH \rightarrow H[HN(R)NHOC(R')CO]_n$ $+ (2n-1)H_2O$, followed by titration of NH_2 groups with 0.1 *N* cresolsulfonic acid in $CHCl_3$ + *m*-cresol (1:1) with cresol red as indicator, is of the 2nd order, with the rate const. $k = 0.0500, 0.0337, 0.0192, 0.0121, 0.0032, 0.0018$ millimole/g./min., at 185, 175, 167, 160, 145, 140°, resp. The mol. wts. of the product are, resp., 5300, 4100, 2200, 1900, 720, 300. Only at higher temps. does k obey the Arrhenius equation; the deviation below 160° is probably due to increased viscosity. In the range of validity of the Arrhenius equation, the activation energy = 24.0 kcal / mole. The temp. coeffs. between 145-55°, 165-75°, and 175-85° are, resp., 2.78, 1.91, and 1.76. At 145°, $ZnCl_2$ and H_3PO_4 have only an insignificant accelerating effect.

2

OPEN
MATERIAL INDEX

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

62-777-1227

SYMBOLS
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797

RAFIKOV, S. R.

PA 27/49T7

USSR/Chemistry - Amides, Formation
Chemistry - Hydrolysis

Jan 49

"The Kinetics of Amide Formation and Hydrolysis,"
G. N. Chelnokova, S. R. Rafikov, V. V. Korshak, 3 pp

"Dok Ak Nauk SSSR" Vol LXIV, No 3

Kinetic study of the reaction of sebacic acid with
hexamethylenediamine under varying conditions (tem-
perature and catalysis). Submitted 8 Oct 48.

27/49T7

RAPIKOV, S.R.

531. Plastmassy. (Plastics.) S. R. RAPIKOV.
Moscow: Gos. Izd. Tekhniko-Teoret. Lit.; 1962,
pp. 47. Price, 96 kopeks. This popular booklet sets

out to show what plastics are, what their internal
structure is, and how the different types of plastics
have been developed, starting from simple raw
materials such as petroleum and coal. Well-
illustrated descriptions are given of dwarf molecules
and giant molecules and of the history of plastics,
including synthetic rubber, reference being exclu-
sively to Russian workers. 38

Chemistry - Organic

9.18

6243' The Mechanism of Catalytic Oxidation of Tetralin
and Decalin in the Vapor Phase. In Russian. S. B. Rudkov
and B. V. Suvorov. *Doklady Akademii Nauk SSSR*, new ser.
V. 82, Jan. 4, 1952, p. 61-63.
Briefly discusses the above.

Handwritten: Chemistry Department

6.1.1

6244* Catalytic Oxidation of the Basic Components of Turpentine in the Vapor Phase. - In Russian: S. R. Rulikov and B. V. Savorov. *Doklady Akademii Nauk SSSR* new ser. v. 82, Jan. 11, 1952, p. 265-267. Briefly discusses chemistry of the above. 11 ref.

Organic Chemistry

Mechanism of the catalytic oxidation of *p*-cymene in the gas phase. S. R. Rafikov and B. V. Suvorov (Chem. Inst. Acad. Sci., Kazakh S.S.R.). *Doklady Akad. Nauk S.S.S.R.* 82, 415-17 (1982).—Under conditions of mild oxidation of vapor of *p*-Me₂CHC₆H₄Me on V₂O₅, the main products are *p*-MeC₆H₄CO₂H, *p*-C₆H₄(CO₂H)₂, CO₂, and H₂O. Other identified products are *p*-MeC₆H₄COMe, *p*-Me₂CHC₆H₄CHO, *p*-O-C₆H₄-O, HCHO, and some BzH, BrOH, AcOH, *p*-C₆H₄(OH)₂, and *p*-MeC₆H₄OH. Absent were *p*-Me₂CHC₆H₄CO₂H and *p*-MeC₆H₄CHO. Maleic anhydride, (C₆H₅)₂, and HCO₂H, which are known to be formed in the oxidation of *p*-O-C₆H₄-O and of C₆H₆, were not found. Nor could peroxide compds. be detected. A complete scheme of the oxidation is proposed in which the variety of products is derived from a primarily formed hydroperoxide, *p*-Me₂C(OOH)C₆H₄Me, and a peroxide, *p*-MeC₆H₄(OOC₆H₄Me)₂.

An intermediate *p*-MeCOC₆H₄Me can be oxidized to the intermediate hydroperoxide, *p*-HOOC₆H₄COOC₆H₄Me. The failure to detect the peroxides is due to their instability and rapid further reactions. The main feature of the catalytic oxidation is the primary attack on the iso-Pr group, in contrast to the low-temp. liquid-phase oxidation (Sensenbrenner and Stubbs, *C.A.* 26, 6924) where the products are *p*-Me₂CHC₆H₄CO₂H and *p*-Me₂CHC₆H₄CHO. N. Thon

PA 24014

USSR/Chemistry - Peroxides

Dec 52

"The Decomposition Mechanism of Benzoyl Peroxide in Solvents," S. R. Rafikov and V. S. Kudinova, Inst of Chem Sci, Acad Sci Kaz SSR, Alma-Ata

"DAN SSSR" Vol 87, No 6, pp 987-990

The decomn of benzoyl peroxide was studied in benzene and ethyl alc. It was found that the mechanism of the decomn depends on the solvent. In solvents which are incapable of reacting with the peroxide group, the decomn is thermal, while in solvents which are capable of reacting with the

24014

peroxide group, the decomn is one of simple exchange of radicals temps below that of thermal decomn. The kinetics and chain mechanisms of the decomn are discussed in detail. The inhibiting action of hydroquinone is explained. Presented by Acad A. N. Nesmeyanov 25 Apr 52.

24014

RAFIKOV, S. R.

Rafikov, S.R.

High-molecular weight compounds. LV. Application of reactions of interchain exchange to processes of linear polycondensation. S. R. Rafikov, V. V. Korschak, and G. N. Chelnokova (Inst. Org. Chem. Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otd. Khim. Nauk* 1953, 743-50; cf. C.A. 48, 3912g, 8918e. — It was shown that the ester links in polyesters can undergo exchange reactions with free HO, CO₂H, or amino groups. The polyamide links are, however, broken only under the attack of amino or CO₂H groups, and are stable toward HO groups of alcs. Narrow fractions of polyesters undergo on heating an extensive change which results in a heterogeneous product whose mol. wt. and structure approaches that of the polyester formed by reaction of the glycol with the dicarboxylic acid (adipic). Heating 7.2 g. adipic acid with 17.4 g. (CH₂OH)₂ 9 hrs. at 180° gave 3.4 g. H₂O-glycol mixt., and the residue heated to 150°/2 mm. yielded 8 g. distillate, which taken up in EtOH and ppd. with H₂O, formed a waxy solid, m. 28-9°, whose mol. wt. was 232, corresponding to the diglycol ester of adipic acid. This heated 4 hrs. to 180°/10-12 mm. gave 1.7 g. distillate and yielded a colorless polyester, m. 38-40°, mol. wt. 1800. Heating di-Bt adipate with (CH₂OH)₂ (equimolar amts.) yields polyesters with mol. wts. up to

1250, when 1% p-MeC₆H₄SO₃H or EtONa catalyst is used and the temp. is kept at 160-95° for 6-7 hrs.; di-Bu adipate reacts less rapidly. Heating di-Bu adipate with a slight excess of (CH₂)₆(NH₂)₂ 3 hrs. at 225-30° gave 1 g. BuOH and yielded a product, m. 190-200°, mol. wt. about 930, which was a polyamide contg. 3 diamine residues per 4 adipate units and 2 BuO groups; extd. with EtOH, it yielded an amorphous powder, m. 108-12°, mol. wt. 385-630. Heating equimolar amts. of adipic acid and AcNH(CH₂)₄NHAc 2 hrs. at 180-200° and 2 hrs. at 210-15° gave 0.25 g. AcOH and polyhexamethylenedipamide, m. 242-5°, mol. wt. 2000. A similar reaction with di-Bt adipate failed to take place even at 210° without a catalyst; in the presence of 0.1 g. p-MeC₆H₄SO₃H a polyamide, m. 244-7°, was formed. Adipamide (14.4 g.) and 31 g. (CH₂OH)₂ heated 3 hrs. at 200° gave 14.1 g. initial diamide. The polyester from adipic acid and (CH₂OH)₂ was fractionally pptd. from C₆H₆ by petr. ether (distribution curve is shown); a narrow fraction, mol. wt. 1100, was heated in sealed tube 42 hrs. at 170°, and fractional pptn. of the product gave a mol. wt. distribution that was very close to that of the initial heterogeneous polyester. LIX. Stereochemistry of α-methylstyrenes in connection with their ability to polymerize. V. V. Korschak and N. G. Matveeva. *Ibid.* 751-6. — Neither 2,6-(MeO)₂C₆H₃CMc:CH₂ (I) nor 2,6,4-MeO(Me₂C)₂C₆H₃CMc:CH₂ (II) could be polymerized. This result is explained by steric hindrance by the 2-o-groups and the α-Me group. II could not be prepd. with RMgX but was prepd. with organo-Na compds. 2,6,4-MeO(Me₂C)₂C₆H₃Ac (100 g.), 210 g. MeI, and 48 g. Na powder in Et₂O treated with 1 ml. EtOH to start the reaction, and, after the initial reaction, the mixt. refluxed 1 hr., kept overnight, and worked up in the conventional manner yielded 15.5% II, b₁ 124-5°, d₂₀ 0.9489, n_D²⁰ 1.5050, after distn. of the org. layer in vacuo. 2,6-(MeO)₂C₆H₃Ac with MeMgI similarly gave 47.6% I, b₁ 136-8°, b₂ 92-4°, m. 30-7° d₂₀ 1.043. G. M. Kosolapoff

CHELMOKOVA, G. N., KORSIAK, V. V., AND RAFIKOV, S. R.

From the Field of High Molecular Compounds. XLIX. Reaction Characteristics of Monoethylamine With Adipic and Sebacic Acids

Investigated the condensation reaction of monoethylamine with adipic acid in order to clarify the reaction mechanism and the intermediate products. Also investigated the condensation of the ethyl ester of epsilon-aminocaproic acid into a polymer. (RZhKhim, No. 1, 1955)
Sb. Statey po Obshch. Khimii, M.-L., Izd-vo AN SSSR, Vol 2, 1953, 1075-1080.

SO: Sum. No. 744, 8 Dec 55 - Supplementary Survey of Soviet Scientific Abstracts (17)

RAFIKOV, S. R., GUTSALYUK, V. G., and EPEL'BAUM, Kh. I.

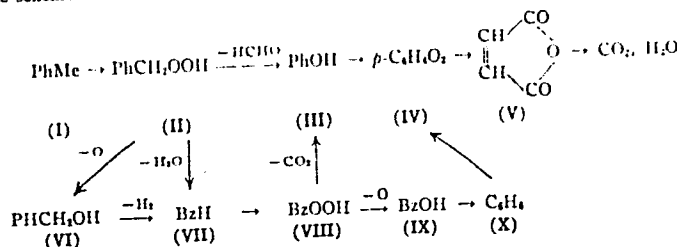
"Viscosity of Paraffin-Base Petroleum at Low Temperatures," Izv. AN Kazakh. SSR, ser. khim., No 7, 1953, pp 111-117

Investigated the effect of cooling rate on dynamic viscosity for two samples of paraffin-base petroleum differing in paraffin content. Established that presence of paraffin affects structural viscosity of the petroleum. Rapid cooling of a paraffin-base petroleum produces many small crystals resulting in a large total surface which is bonded to the liquid phase, thus increasing the total volume of the solid phase, which brings about an increase in viscosity. Slow cooling produces large crystals with a smaller total surface and hence brings about a lower viscosity. (RZhKhim, No 19, 1954)

CC: Cu . No 562, 6 Jul 55

Mechanism of the vapor-phase oxidation of toluene, benzyl alcohol, and benzaldehyde, in the presence of vanadium pentoxide, B. V. Suvorov, S. R. Raikov, and I. G. Anuchina, *Dokl. Akad. Nauk S.S.S.R.* 88, 79-82 (1953). Oxidation of PhMe in the temp. range 300-75° yields mainly CO₂, H₂O, BzH, BzOH, quinone, maleic anhydride, and anthraquinone, and small amts. of PhOH and HCHO. The process can be represented by the scheme of these products, only VI was

Chemical Abst.
Vol. 48 No. 4
Feb. 25, 1954
Organic Chemistry



not detected. The scheme involves 2 intermediate peroxides, II and VIII. Anthraquinone (XI) was detected in the oxidation of I, but not in the oxidation of either VI or VII. The formation of XI evidently proceeds by way of I + O₂ + I $\xrightarrow{-\text{H}_2\text{O}}$ C₁₄H₁₀ → XI. In the oxidation of I, the total amt. of VII + IX does not exceed 4%; that this is due to further reactions of VII and IX follows from the observation with a contact time shortened by a factor of 4, the yield of

VII is as high as 25% of the original I. In the oxidation of pure VII in the same temp. range, the main products are IX, IV, and V; as a function of the temp., their amts. pass, successively, through max. Advance addn. of H_2O increases the total yields markedly, but without altering the consecutiveness of the max. Oxidation of VI also yields, in the main, the products of incomplete oxidation, but in somewhat smaller amts. than VII. Production of VII and of IX proceeds simultaneously; this is taken as evidence that IX is formed not only from VII, but also directly from VI, over the corresponding hydroperoxide, $VI \xrightarrow{+O_2} PhCH(OH)OOH \xrightarrow{-H_2O} IX$. Addn. of H_2O vapor again increases the yields of the intermediate products, without altering the disposition of the max.

N. Thon

MF
7-14-54

RAFIKOV, S. R.

Oxidation of organic compounds. IV. Catalytic oxidation of tetrahydronaphthalene and decahydronaphthalene in vapor phase. B. V. Suvorov and S. R. Rafikov. *Izvest. Akad. Nauk Kazakh. S.S.R.* No. 118, Ser. Khim., No. 6, 82-9(1953); cf. *ibid.* No. 5(1951).—The oxidation of tetra- and decahydronaphthalene in the vapor phase over V oxides was examd. The 1st phase of the reaction was shown to be dehydrogenation to $C_{10}H_8$. The main reaction products are $o-C_6H_4(CO)_2O$, 1,4-naphthoquinone, $C_{10}H_6$, H_2O , and CO_2 . Small amts. of β -naphthoquinone, BzH and $BzOH$ are found. The overall reaction scheme can be developed from the peroxide theories expressed by Bakh [*J. Russ. Phys. Chem. Soc.* 29, 373(1897)]. The "hydroxy" hypothesis is severely criticized for being unable to predict the actual reaction products. G. M. Kosolapoff

R. A. F. Kou, S. R.

2000

✓ Research in the oxidation of organic compounds. S. R. Rafikov and B. V. Suvorov. *Izvest. Akad. Nauk Kazakh. S.S.R. No. 120, Ser. Khim. No. 5, 85-90 (1953).*— α -Pinene (I) or *dl*-limonene (II) vapor oxidized in air on hot V_2O_5 gave *p*- MeC_6H_4COMe (III), *p*-toluic acid, cumaldehyde, terephthalic acid, *p*-cresol (IV), $BzOH$, BzH , CH_3O , hydroquinone, and *p*-quinone (V). I first isomerized into II, dehydrogenation of which gave *p*-cymene and *p*-isopropenyltoluene; these formed peroxides which decompd. to give IV and III, resp. The peroxides of III and IV formed aldehydes, acids, and finally V, which oxidized into CO_2 and water; only here did the benzene ring break. Equations are given. Malcolm Anderson

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DM
F32

RAFIKOV, S.R.

1. Oxidation of organic compounds. V. Oxidation-reduction reaction of furfural with formaldehyde. S. R. Rafikov and Kh. M. Mirfakhov. *Izvest. Akad. Nauk Kazakh. S.S.R. No. 123, Ser. Khim. No. 7, 40-53 (1963); cf. Vestnik Akad. Nauk Kazakh. S.S.R. No. 8, 115 (1950); C.A. 48, 12717f.*—A large excess of CH_2O in a crossed Cannizzaro reaction with furfural is useless, as the course of the reaction is detd. by the oxidation-reduction properties of the substances involved and not by their relative aunts. The bulk of the furfural alc. (I) is formed within 3 hrs. and the best reaction temp. is 15-25°. The yield of pure I at a 1:1 to 1:1.5 ratio of furfural to CH_2O is 70-3%. Furfural is readily prepd. from reeds by hydrolysis with 10% HCl in the presence of NaCl with continuous steam distn.; a 9.7% yield (dry wt.) is obtained. Furfural (0.4 mole), 1.3 moles CH_2O (as a 35% soln.), and 90 ml. H_2O treated over 60 min. with 120 g. 50% NaOH gave, after a final 4 hrs. at 40-5°, 78% pure I. Oxidation of organic compounds. VI. Reaction of decomposition of benzoyl peroxide in benzene. S. R. Rafikov and V. S. Kudina. *Ibid.* 54-59.—Decompn. of Bz_2O_2 in C_6H_6 proceeds noticeably with evolution

of CO_2 at 70° or above. At low temps. there occurs a reversible decompn. with formation of BzO radicals, while at higher temps. the decompn. yields Ph radical and CO_2 , the amt. of the latter rising with the temp. The main reaction products are BzOH , Ph , $(\text{PhC}_6\text{H}_5)_n$, and resins of the polyphenyl type, along with small aunts. of BzOPh , PhC_6H_5 , and traces of H_2 . It is suggested that the decompn. in which Ph and BzO radicals are formed is followed by reaction of these with the solvent to yield the above listed products. The reaction shows the characteristics of branched-chain reactions. VII. Mechanism of the catalytic oxidation of camphene, cineole, and bornyl acetate in the vapor phase. B. V. Suvorov and S. R. Rafikov. *Ibid.* 70-4.—The vapor-phase oxidation over a V catalyst of camphene and 1,8-cineole with air gave *p*-cresol, *p*-toluic and terephthalic acids, *p*-benzoquinone, CH_2O , and CO_2 . Bornyl acetate gave no aromatic products or their *O*-derivs., thus indicating more rapid decompn. of the ring system. It is probable that the 1st 2 substances yield an *O*-bridged structure hydrating to a *p*-di-HO deriv., which is dehydrated to a diene, which then undergoes oxidation proper. G. M. Kosolapoff

RAFIKOV, S.R.; KUDINOVA, V.S.

Oxidation of organic compounds. Part 6. Decomposition of benzoyl
peroxide in benzene. Izv. AN Kazakh. SSR no. 123:54-69 '53.
(MLRA 7:3)
(Benzoyl peroxide)

SUVOROV, B.V.; RAFIKOV, S.R.

Oxidation of organic compounds. Part 7. Mechanism of catalytic
oxidation of vapor phase camphene, cineole, and bornyl acetate.
Izv. AN Kazakh. SSR no. 123:70-74 '53. (MLBA 7:3)
(Oxidation) (Terpenes)

GUTSALYUK, V.G.; EPPEL'BAUM, Kh.I.; RAFIKOV, S.R.

Viscosity of paraffin-base petroleum at low temperatures. Izv.
AN Kazakh.SSR no.123:111-117 '53. (MLRA 7:3)
(Petroleum) (Viscosity)

RAFIKOV, S. S.

(3)

Dehydrogenation and irreversible catalysis of dipentene on vanadium oxides. S. R. Rafikov, B. V. Suvorov, and L. K. Tuturova. *Doklady Akad. Nauk S.S.S.R.* 94, 895-8 (1954).—Passage of pure dipentene over V oxide catalyst in absence of O_2 at 300–550° gave the following results: from 300 to 50° there is a decline in the yield of unsaturates (from 80% to 37%), and along with dehydrogenation there is formation of *p*-cymene. At higher temp. the yield of the latter rises (to 80%) and menthane appears in the catalyzate. Above 475° dehydrogenation predominates and the yield of *p*-cymene drops; menthane is absent and the yield of *p*-isopropenyltoluene and H_2 rises, apparently as a result of direct dehydrogenation of the starting material. If enough air is admitted into the reaction tube to consume the liberated H_2 , no menthane is formed, and the yield of *p*-cymene drops from 80% to 59%; not all H_2 is oxidized, however. At 450–500° there are found small amts. of Me_2CO and *p*-methylacetophenone. With a 2-fold excess of air (over the above amt.) the yield of cymene drops still lower, and all H_2 is consumed in formation of H_2O . Thus air represses the reactions of irreversible catalysis and favors the purely dehydrogenative reactions.

G. M. Kosolapoff

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9-14 b-1

RAFikov, S. R.

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✓ Oxidation of organic compounds. VIII. Catalytic transformations of dipentene in the presence of vanadium oxides. B. V. Suvorov, S. R. Rafikov, and L. K. Tuturova. *Izvest. Akad. Nauk Kazakh. S.S.R., Ser. Khim.* 1955, No. 8, 133. CH
43 (in Russian); cf. C.A. 46, 11125c; 49, 2122b. — Passage of dipentene over V oxide catalyst in the absence of O or with small amts. of air at 620° results in different products. Without O the products are *p*-cymene, *p*-menthane, *p*-

isopropenyltoluene and H. With air present the products are *p*-isopropenyltoluene and *p*-cymene. Thus the 1st stage in the reaction of dipentene is dehydrogenation to an aromatic intermediate. Analysis of cymene-menthane mixts. can be done by treatment with S-CH₃ (cf. Nametkin, et al., C.A. 32, 6847). G. M. Kesolapoff

(2)

RAF, KOU, S.R.

V Oxidation of organic compounds. XI. Catalytic oxidation of p-cymene in the liquid phase. M. I. Khmura, B. V. Suvorov and S. R. Rafikov (Zh. obshch. Khim. SSSR, 1955, 23, 1418-1423) - A study of

NO. 7.

the mechanism of the oxidation of p-cymene by air in the liquid phase in the presence of Mn, Co and Cu toluates, Mn terephthalates and naphthalenes, MnO₂, and foamed glass, at 170--172°. It is considered that the hydroperoxide of p-cymene is first formed, and that this loses MeOH to give methyl p-tolyl ketone, which in turn oxidises to p-toluic acid and thence to terephthalic acid. The hydroperoxide of acetone also decomposes directly to give acetone and p-cresol, but in small quantities. Alongside the oxidation of p-cymene, a condensation reaction leads to the formation of 1 : 1 : 2 : 2-tetramethyl-1 : 2-di-p-tolyloethane. Reference is made

to the increase in activity of the H-atom of the isopropyl group at higher temp. Up to 110°, preferential attack occurs at the Me group, presumably because the H-atom of the isopropyl group is protected by steric factors; at higher temp. the mobile H of the isopropyl group enjoys greater freedom and reacts preferentially to the Me group. (33 references.) K. F. A. LINTON

(3)

RAFIKOV, S.R.

China/Chemical Technology. Chemical Products and Their Application -- Industrial organic synthesis, I-14

Abst Journal: Referat Zhur - Khimiya, No 2, 1957, 5657

Author: Rafikov

Institution: ~~None~~

Title: Advances in Chemistry and Technology of Primary Organic Synthesis

Original
Publication: Kesyue tunbao, 1956, No 6, 29-39

Abstract: Translation of a paper read in Chinese People's Republic on 14 October 1955.

Card 1/1

~~RAFIKOV, S.R.~~ RAFIKOV, S.R.

5001. OXIDATION OF ORGANIC COMPOUNDS. IX. DETERMINATION OF ACTIVE OXYGEN IN SOLID FUEL. RAFIKOV, S.R. and Bibiryakova, N.Ya. (Izv. Akad. Nauk Kazakh. SSR, Ser. Khim. (Russ. Acad. Sci. Kazakh. S.S.R., Ser. Chem.), 1956, (9), 13-22; abstr. in Chem. Abstr., 1956, vol. 50, 8992). Adsorption of iodine by various coals from aqueous solution was examined; the differences in adsorptive qualities of coal samples make the use of the iodometric method dubious for determination of active peroxide oxygen in coal. This form of oxygen in coal can be determined accurately by topochemical reaction of hydroquinone dissolved in water in which the peroxide groups react with the reagent. The values are expressed as peroxide number which is ml of 0.01 N sodium thiosulfate needed for iodometric determination of quinone formed in the reaction. Temperature, adsorption, surface active substances, and mineral salts can affect the determination of peroxides in coal. The adsorbed oxygen is not determined by the above method.

C.A.

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UPOROVA, Ye.P.; RAFIKOV, S.R.

Determination of carboxyl and phenol groups in coal. Izv.AN Kazakh.
SSR. Ser.khim.no.9:23-32 '56. (MIRA 9:7)
(Coal--Analysis)

RAFIKOV, S.R.

Oxidation of organic compounds. X. Mechanism of
Processes of autooxidation and spontaneous combustion of
coal. S. R. Rafikov. *Izvest. Akad. Nauk Kazakh S.S.R.*
Ser. Khim. 1966, No. 9, 75-91. cf. C.A. 50, 1676i.—
Review with 35 references. G. M. Kosolapoff

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RAFIKOV, S. R.

Determination of the wax content of crude oil. V. G. Gutsalyuk, N. D. Kazakova, and S. R. Rafeikov. *Izvest. Akad. Nauk Kazakh. S.S.R., Ser. Khim.* 1956, No. 10, 91-5.—The most accurate wax detn. consists in the removal of tars with silica gel, followed by pptn. of solid paraffins with C_6H_6 and $(CH_2Cl)_2$ in the ratio 2:14 and 1:14 per 1 part of sample. The use of these ratios gave results very close to those obtained with C_6H_6 and Me_2CO in the ratio 10:5:1.

G. M. Kosolapoff

Fail

3/

62-11-25/29

AUTHORS: Tsetlin, B. L., Rafikov, S. R.

TITLE: On the effect of X-Radiation on Polyamides (O deystvii rentgenovskogo izlucheniya na poliamidy)

PERIODICAL: Izvestiya AN SSSR, Otdel.Khim.Nauk, 1957, Nr 11, pp.1411-1413 (USSR)

ABSTRACT: Here the effect of a highly intensive X-radiation on polyhexamethylenadipinamide (anide) and polyamide, which forms a product of a mutual polycondensation of the hexamethylenediamine with the azelaic acid, the adipinic acid and caprolactome (anide G-669, reference 2), was investigated. The samples of the anide G-669 were investigated in non-stretched, those of the anide in stretched condition. It is shown that under the radiation influence in the polyamides processes of a radiation vulcanization and such of a crystallization decrease take place. There are 2 figures and 6 references, 5 of which are Slavic.

ASSOCIATION: Institute for Element-Organic Compounds of the AN USSR (Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR)

SUBMITTED: June 19, 1957

AVAILABLE: Library of Congress

Card 1/1

RAFIKOV, S. R.

Cher Catalyst carrier of porous material. L. K. Kovsky, D. V. Sokol'ski, and S. R. Rafikov. U.S.S.R. 104,883, Feb. 25, 1967. The carrier is made of cellular glass to increase its heat resistance and activity. M. Hosh

KAFIKOV, S. R.

Hydrocyanic acid? B. V. Suvorov, S. R. Rafikov, V. S.
Kudinova, and M. I. Khmura. U.S.S.R. 106,226, July 25,
1957. HCN is obtained by the catalytic oxidation of a
mixture of MeOH and NH₄OH. A mixture of V and Sn oxides
is used as the catalyst. M. Hosh

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Rafikov, S. K.

Catalytic production of p-toluic acid. R. V. Savogov,
S. B. Rafikov, and L. G. Manukovskaya. U.S.S.R.
107,178, Aug. 25, 1957. p-Xylene is oxidized with mol. O
in the presence of Co acetate as catalyst to give p-toluic acid.
M. Hoshino

1/1

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ITE

RAFIKOV, S. R.

AUTHOR SUVOROV, B.V., RAFIKOV, S.R.,
KUDINOVA, V.S., KHMURA, M.I.,
20-2-31/67

TITLE On the Mechanism of Oxidation Transformations of Methyl Alcohol
Formaldehyde and Formic Acid in the Vapour phase in the Presence
of Tin Vanadate.
(O mekhani zme okislitel'nykh prevrashcheniy meti lovogo spirta
formaldegida i mirav'inoy kisloty v parovoy faze v prisutstvii
vanadata alova

PERIODICAL Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 2, pp 355-357,
(U.S.S.R.)
Received 6/1957 Reviewed 7/1957

ABSTRACT On the occasion of oxidation of alkyl benzols in the vapour phase
on vanadium catalysts a considerable quantity of compounds of re-
latively small molecules develops as by-products. Formaldehyde,
carbon monoxide and -dioxide among them develop the main products.
The formation mechanism and further transformations of these "splin-
ters" are in sufficiently investigated (methanol, formic acid and
others would be expected especially on the occasion of oxidation
of the benzol homologues with an isopropyl group). The present
particulars indicate that the lowest aliphatic alcohols are the
most unsteady ones. Larger quantities of corresponding aldehydes
and products of a complete combustion develop from them by oxida-
tion. The yield of acids is small, allegedly because of its unstea-
diness under these conditions. Oxidation was carried out in a dis-

Card 1/3

On the Mechanism of Oxidation Transformations
of Methyl Alcohol, Formaldehyde and Formic acid in the Vapour
Phase in the Presence of Tin Vanadate.

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20-2-31/67

charge plant (1100 mm length, 21 mm of diameter). The results of experiments with methanol showed that it completely enters into the reaction already at a temperature of 310° . The main products were: formaldehyde and carbon monoxide, the latter obviously as decomposition product of formaldehyde. This is confirmed by the results of the oxidation of formaldehyde itself. Moreover, illustration 1 shows that, on the occasion of formic acid, up to 40% CO_2 develop whereas in the case of methanol and formaldehyde its share does not exceed 10%. This demonstrated that formic acid cannot be looked upon as necessary by-product of a complete oxidation of methanol and formaldehyde. Obviously here the reaction proceeds in several directions. Also the residual oxidation of carbon monoxide is here out of the question as the reaction of tin vanadate at a temperature of 410° proceeds only slowly. According to the peroxide- and chain-theory it is possible to suppose a general scheme of oxidation of methanol (and formaldehyde) (reaction II) based on the results obtained. For the purpose of an additional testing of this scheme, it was interesting to investigate the oxidation of methanol under comparable conditions, however under presence of ammonia. As expected up to 90% cyano-hy-

Card 2/3

On the Mechanism of Oxidation Transformations ~~XXXXXXXXXX~~
of Methyl Alcohol, Formaldehyde and Formic Acid in the Vapour
Phase in the Presence of Tin Vundate. 20-2-31/67

drogen developed on this occasion, probably by formamide. Ammonia (3-5 g per 1 g initial matter) did not effect any essential modifications of the HCN. CO does not react with ammonia at the experimental temperature either. It is characteristic that on the occasion of interaction between formic acid and ammonia under similar conditions the HCN-yield does not exceed 50%. So the high HCN- yield cannot be caused by the intermediate formation of formic acid. The results of these latter experiments thus confirm (under the given experimental conditions) the above transformations of methanol and formaldehyde following each other.
(2 illustrations, 16 citations from publications)

ASSOCIATION Institute for Chemical Science of the Academy of Science of the
U.S.S.R.
PRESENTED BY ARBUZOV, B.A., Member of the Academy.
SUBMITTED 29.9.1956
AVAILABLE Library of Congress.
Card 3/3

INDEXED, PA

AUTHOR SUVOROV B.V., RAFIKOV S., SOLOMIN A.V. and PA - 3162
KHMURA M.I.

TITLE On Vapor Phase Oxidation of Styrene and α -Methylstyrene on
Tin Vanadate.
(O parofaznom okislenii stirola i α -metilstirola na vanadate
olova.- Russian)

PERIODICAL Doklady Akademii Nauk SSSR 1957, Vol 113, Nr 3, pp 624-626
(U.S.S.R.)

ABSTRACT Received: 7/1957 Reviewed: 8/1957
From the experimental results shown in two tables it appears
that the yield of the single oxidation-products of each
initial-substance depends on the temperature of the reaction:
an increase of the latter advances a gradual destruction of
the carbon-skeleton of the compound to be oxidized. In the
case of experiments carried out at relatively low temperature
carbonyl-compounds with unchanged aromatic ring and benzoic
acid predominated among the products of the reaction.
With rising temperature its yield is reduced and the quantity
of chinone and maleinanhidride increases. The quantity of low-
molecularproducts of the complete and uncomplete oxidation is
a very characteristic index. From the obtained data it appears
that the total quantity of formaldehyde, CO and CO₂ at low

CARD 1/2

PA - 3:29

On vapor Phase Oxidation of Styrene and α -Methylstyrene on Tin Vanadate.

temperatures does not surpass 1.25 mol per mol of the oxidized carbon. This points to the fact that the low-molecular-products chiefly occur at the cost of the burning away of the lateral groups. The results obtained give rise to the assumption that the oxidation of the styrene and the α -methylstyrene in the vapour phase with tin vanadate in the primary phases takes place in the same direction as the oxidation in the condensation-phase with or without catalyzers. In the case of styrene a thermal decay with formation of benzaldehyde and formaldehyde is probable, and in the case of methylstyrene a thermal decay with formation of acetophenone and formaldehyde. Experimental results confirm this assumption. At higher temperatures no acetophenone or benzaldehyde could be detected in the reaction-products.

(2 tables and 3 citations from Slavic publications.)

ASSOCIATION: Institute for Chemical Science of the Academy of Science of the Kasakstan SSR.

PRESENTED BY: Arbuzov B.A., 3.10. 1956.

SUBMITTED: 29.9. 1956.

AVAILABLE: Library of Congress.

CARD 2/2

KORSHAK, Vasil'y Vladimirovich; VINOGRADOVA, Svetlana Vasil'yevna;
RAFIKOV, S.R., doktor khim.nauk; BANKVITSER, red. izd-va;
KUZ'MIN, I.F., tekhn.red.; KASHINA, P.S., tekhn.red.

[Heterogeneous chain polyesters] Geterotsepnnye poliefiry.
Moskva, Izd-vo Akad. nauk SSSR, 1958. 403 p. (MIRA 11:12)
(Esters)

MAKAREVICH, V.G.; SUVOROV, B.V.; RAFIKOV, S.R.

Oxidation of organic compounds. Liquid phase oxidation of α -pinene by
molecular oxygen in the presence of inhibitors. Part 13. Izv. AN Ka-
zakh. SSR. Ser.khim. no.1:79-83 '58. (MIRA 12:2)
(Pinene) (Oxidation)

RAF-1-00, S.R.

66358

SOV/81-59-19-68673

5.3300(A)

Translation from: Referativnyi zhurnal. Khimiya, 1959, Nr 19, pp 310 - 311 (USSR)

AUTHORS: Solomin, A.V., Suvorov, B.V., Rafikov, S.R.

TITLE: The Oxidation of Organic Compounds. Communication XVI. On the Effect of the Structure of the Side Chain on the Vapor-Phase Oxidation of Monoalkylbenzenes in the Presence of Vanadium Catalysts

PERIODICAL: Tr. In-ta khim. nauk. AN KazSSR, 1958, Nr 2, pp 182 - 187

ABSTRACT: The vapor-phase oxidation has been studied of toluene (I), ethylbenzene (II), cumene (III), α -methylstyrene (IV) and styrene (V) by moistened air in the presence of $\text{Sn}(\text{VO}_3)_4$ (VI), the alloy $\text{V}_2\text{O}_5 : \text{SnO}_2$ 1:1 (VII) and $\text{V}_2\text{O}_5 : \text{MoO}_3 : \text{P}_2\text{O}_5$ (1:0.34:0.003) (VIII). The experiments are carried out at a temperature of 300 - 400°C, the time of contact 0.1 - 0.3 sec, the weight ratio of the oxidized substance to air 1:75-1:85, and the supply rate of the initial substance and water 5-6 g/hr and 100 - 105 g/hr respectively. The quantity of the side reactions depends on the structure of the initial alkylbenzene and on the conditions of the process conducted. At the oxidation of I and III over IV at a temperature $> 340^\circ\text{C}$ principally $\text{C}_6\text{H}_5\text{COOH}$ (IX), maleic

Card 1/2

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SOV/81-59-19-68673

The Oxidation of Organic Compounds. Communication XVI. On the Effect of the Structure of the Side Chain on the Vapor-Phase Oxidation of Monoalkylbenzenes in the Presence of Vanadium Catalysts

anhydride (X) and a small quantity of quinone are formed. At a temperature $\leq 340^{\circ}\text{C}$, besides IX and X 3-5% benzaldehyde is formed from I and 3-5% acetophenone from III. The oxidation of I, II and III over IV, and of II and III over VIII proceeds in an analogous way to the oxidation over VI, but the optimum conditions lie in the region of higher temperatures. In all experiments the presence of phenol, hydroquinone and formaldehyde has been proved. VIII is inactive in the reaction of the oxidation of I. The oxidation of IV and V proceeds analogously to the oxidation of monoalkylbenzenes. A diagram of the reaction and its possible trends, depending on the intermediate products, has been proposed. Communication XV see RZhKhim, 1959, Nr 11, 3957C.

T. Sladkova

4

Card 2/2

MANUKOVSKAYA, L.G.; SUVOROV, B.V.; RAFIKOV, S.R.

Oxidation of organic compounds. Report No.17: Autoxidation of
n-butyraldehyde, benzaldehyde and p-tolualdehyde. Trudy Inst.
khim.nauk AN Kazakh. SSR 2:188-196 '58. (MIRA 12:2)
(Oxidation) (Aldehydes)

KAZAKOVA, N.D.; GUTSALYUK, V.G.; RAFIKOV, S.R.

Extractive crystallization with urea as a method for quantitative
determination of n-hydrocarbons in petroleum paraffins. Trudy Inst.
khim.nauk AN Kazakh. SSR 2:210-217 '58. (MIRA 12:2)
(Hydrocarbons) (Crystallization)

AUTHORS: Solomin, A. V., Saverov, B. V., Rafikov, S.R. 79-1-25/63

TITLE: The Oxidation of Organic Compounds (Oksleniye organicheskikh soedineniy). XV. On the Oxidation of Ethyl Benzene in the Vapor-Phase State Over Tin Vanadate (XV. O parofaznom okslenii etilbenzola na vanadate olova).

PERIODICAL: Zhurnal Obshchey Khimii, 1958, Vol. 28, Nr 1, pp. 133-138 (USSR).

ABSTRACT: The oxidation of alkyl benzenes with a secondary α -carbon atom in the vapor-phase state had not been sufficiently investigated. Only one paper had been published on this subject in which it is pointed out that on passage of ethylbenzene vapors in a mixture with air only benzoic acid is formed. The yield at 270-280° C amounted to 4%. The aim of the present paper was an exact investigation of the fundamental rules governing this reaction, special attention in the oxidation being paid to the intermediate and final products. Some of the intermediate products were oxidized under equal conditions. The obtained experimental results show that the vapor-phase oxidation of ethylbenzene with air takes a very complicated course and according to the prevailing conditions leads to

Card 1/3

The Oxidation of Organic Compounds. XV. On the Oxidation of Ethyl Benzene in the Vapor-Phase State Over Tin Vanadate.

77-1-25/15

the formation of different oxygen-containing compounds. Thus the authors beside benzoic acid also found benzaldehyde, acetophenone, quinone, maleic anhydride, CO and CO₂ and quantitatively determined their amounts. The dependence of the yield of some of the enumerated reaction products on temperature is represented in diagram.1. A scheme of the fundamental direction of the vapor-phase oxidation of ethylbenzene over tin vanadate was suggested which is based on the data of the peroxide theory and on the theory of the radical-chain processes. The assumption was uttered that the oxidation of ethylbenzene might simultaneously proceed in several parallel directions, in main as well as in side directions. Each of those represents a multistage process of a gradual decomposition of the carbon skeleton, with a subsequent formation of a large number of by-products. The final stage of each of these directions consists of the formation of products of the completed oxidation. There are 5 figures and 12 references, 10 of which are Slavic.

ASSOCIATION: Institute for Chemical Sciences AN Kazakh SSR (Institut khimicheskikh nauk Akademii nauk Kazakhskoy SSR).
Card 2/3

The Oxidation of Organic Compounds. XV. On the Oxidation of
Ethyl Benzene in the Vapor-Phase State Over Tin Vanadate.

79-1-28/63

SUBMITTED: December 3, 1956

AVAILABLE: Library of Congress

Card 3/3

1. Chemistry 2. Organic compounds-Oxidation

5(4)

AUTHORS:

Pavlova, S. A., Rafikov, S. R.,
Tsetlin, B. L.

SOV/20-123-1-34/56

TITLE:

On the Regularities of the Radiation Vulcanization of Polyamides
(O zakonmermostyakh radiatsionnoy vulkanizatsii poliamidov)
By Means of the Samples of Anid G-669 (Na primera anida G-669)

PERIODICAL:

Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 1, pp 127-130
(USSR)

ABSTRACT:

The present paper deals with the procuring of experimental proof of the reactions of the destruction and structural formation by the action of an ionizing radiation upon polyamides. The soluble mixed polyamide "Anid G -669", which is produced by polycondensation of hexamethylene diamine with adipic acid and mitazelaic acid as well as with caprolactate, was used as experimental object. The samples of 1 mm thickness of "Anid G -669" were irradiated for 1 - 20 hours in air and also in a vacuum. An X-ray tube of the type TRB -3 was used as radiation source. A diagram shows the thermomechanical curves of the compression of the samples of "Anid G -669" as a function of the dose. Already after three hours of irradiation a fraction, which is insoluble in acetic acid (7 percents of weight), occurs,

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On the Regularities of the Radiation Vulcanization
of Polyamides. By Means of the Samples of Anid G-669

SOV/20-123-1-34/56

the portion of which increases to 76% after being irradiated for 10 hours. The second diagram shows the dependence of the viscosity of the solutions on their concentration for "Anid G -669" in creosol and in acetic acid. As a result of irradiation, the viscosity for creosol solutions decreases and it increases for solutions in acetic acid. Two further diagrams show the results obtained by the turbidimetric titration of non-irradiated and irradiated "Anid G -669" in form of integral and differential distribution curves (with respect to solubility). The maximum of the original differential distribution curve divides into a double maximum as a result of irradiation. The distance between the two maxima increases with an increase of the dose. If the dose is larger than that corresponding to the forming of a yellow color, the differential distribution curves correspond to the distribution over solubility within the brine fraction. The experimental data obtained by the present paper show the following: Under the influence of irradiation processes of production of transversal bonds and of the destruction of the main chains of the macromolecules take place in the polyamide.

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On the Regularities of the Radiation Vulcanization
of Polyamides . By Means of the Samples of Anid G-669

SOV/20-123-1-34/56

A complex investigation of the change of the mechanical properties and of the properties of the solutions, as well as of the distribution function with respect to molecular weights makes it possible to give a sufficiently complete estimate of the change of the molecular structure of polyamides during their radiation-chemical transformation. Apparently, the application of similar investigation methods makes it possible to separate the parallel reactions of structural formation and of the destruction of polymers of different structures. There are 4 figures and 8 references, 5 of which are Soviet.

PRESENTED: June 25, 1958, by V. A. Kargin, Academician

SUBMITTED: June 23, 1958

Card 3/3

15(8)

PHASE I BOOK EXPLOITATION

SOV/2419

Rafikov, Sagid Raufovich, Professor

Plastmassy (Plastics) 2d ed., enl. Moscow, Fizmatgiz, 1959. 69 p.
(Series: Nauchno-populyarnaya biblioteka, vyp. 42) 75,000 copies
printed.

Ed.: V.A. Mezentsev; Tech. Ed.: V.N. Kryuchkova.

PURPOSE: The booklet is intended for the general reader.

COVERAGE: The booklet discusses the characteristics and uses of various types of plastic materials. Emphasis is placed on light weight, resistance to alkalies, acids, sea water, etc. The application of plastics in construction, in the manufacture of chemical apparatus, in surgery and electrical engineering is discussed. More than 100,000 parts of the "TU-104" airplane are made of plastics. In agriculture plastics are used for manufacturing parts of farm machinery, in hothouses, films for reducing the drying out of the soil and for protecting young plants against cloudbursts and

Card 1/2

Plastics

SOV/2419

hail. The use of insulating plastics, foam plastics, glass-reinforced plastics, textile fiber-reinforced plastics, vibration absorbing plastics, and ionites is covered. No personalities are mentioned. There are 17 references, all Soviet.

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3. How Plastic and Synthetic Resins Were Developed	31
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AVAILABLE: Library of Congress	

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A005/A001

//, 1100

Translation from: Referativnyy zhurnal, Khimiya, 1960, No.21, p. 47, # 83966

AUTHORS: Rafikov, S. R., Suvorov, B. V.

TITLE: On the Problem of the Mechanism of Inhibitor Action on the Oxidation by Molecular Oxygen

PERIODICAL: V sb.: Okisleniye uglevodorodov v zhidkoy faze. Moscow, AN SSSR, 1959, pp. 94-100

TEXT: At the oxidation of cyclohexene (at 40°C), additions of 0.1% hydroquinone, 0.05% phenol, 0.05% n-aminophenol, 0.025% n-phenylene diamine, 0.6% aniline, 0.05% diphenyl amine, added at the beginning of the process, give rise to an induction period of 5-7 hours duration; additions introduced during the reaction process decelerate the process when 2-11% hydrogen peroxide are accumulated in the system. At the oxidation of $C_6H_5C_2H_5$ (at 50°C) in the presence of hydroquinone, the latter is converted into quinone during the induction period. At 50-180°C, O_2 does not oxidize essentially hydroquinone, phenol, and pyrogallol. H_2SO_4 (0.05%) strongly inhibits the oxidation of i-propylbenzene and benzaldehyde,

Card 1/2

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A005/A001

On the Problem of the Mechanism of Inhibitor Action on the Oxidation by Molecular Oxygen

in the authors' opinion, in consequence of the formation of phenol at the interaction of H_2SO_4 with the hydrogen peroxide of 1-propylbenzene. The action mechanism of inhibitors of different chemical nature is discussed.

R. Milyutinskaya

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

26
RAFIKOV, S.R.; SUVCHOV, B.V.; KAGARLITSKIY, A.D.

Dehydrogenation of benzylamine on titanium vanadate under conditions
of oxidative ammonolysis. Izv. AN Kazakh. SSR, Ser. khim. no. 1: 77-79
'59. (MIRA 13:6)

(Benzylamine) (Dehydrogenation) (Titanium vanadate)

SUVOROV, B.V.; RAFIKOV, S.R.; KHMURA, M.I.

Oxidation of organic compounds. Report No.23: Vapor phase catalytic
oxidation of P-cymene by humid air. Izv.AK Kazakh.SSR.Ser.khim.
no.1:80-84 '59. (MIRA 13:6)
(Cymene)

PEL'BAUM, Kh.I.; GURSALYUK, V.G.; RAFIKOV, S.R.

Influence of the residues of thermal cracking on the viscous properties of lubricating oils. Izv.AN Kazakh.SSR.Ser.khim. no.1:95-106 '99.
(MIRA 13:6)

(Lubrication and lubricants)

KOSTROMIN, A.S.; KUDINOVA, V.S.; RAFIKOV, S.R.; SUVOROV, B.V.; KHOCURA, M.I.

Oxidation of organic compounds. Report No. 20: Effect of
water addition on catalytic oxidation of aromatic compounds
in the gaseous phase. Izv.AN Kazakh.SSR.Ser.khim. no.2:56-
61 '59. (MIRA 12:8)

(Aromatic compounds) (Oxidation)

MAIPIKOVSKAYA, L.G.; RAFIKOV, S.R.; SUVOROV, B.V.

Oxidation of organic compounds. Report No. 21: Liquid-phase catalytic oxidation of n-toluic acid and some of its derivatives by molecular oxygen. Izv.AN Kazakh.SSd.Ser.khim. no.2: 62-67 '59. (MIRA 12:8)

(Toluic acid)

(Oxidation)

GUTSALYUK, V.G.; RAFIKOV, S.R.; BAYARSTANOVA, Zh.Zh.

Production of plastics on the basis of oxidized bituminous
petroleum residues. Izv.AN Kazakh.SSR.Ser.khim. no.2:72-
78 '59. (MIRA 12:8)

(Plastics) (Petroleum waste)

KARASILEVSKIY, A.I.; GUTSALYUK, V.G.; RAPIKOV, S.R.

Investigating the residues of thermal cracking. Izv.AN Kazakh.
SSR.Ser.khim. no.2:102-110 '59. (MIRA 12:8)
(Cracking process)

ROZHKOV, A.M.; RAFIKOV, S.R.; ANUCHINA, I.G.

Copolymerization of dipentene and acrylonitrile. Izv.Sib.otd.
AN SSSR no.5:48-54 '59. (MIRA 12:10)

1. Khimiko-metallurgicheskiy institut Sibirskogo otdeleniya
Akademii nauk SSSR.
(Acrylonitrile) (Dipentene)

RAFIKOV, S.R.; CHELMOKOVA, G.N.; GRIBKOVA, P.N.

Chemical conversions of polymers. Part 2: Polyoxyethylation of polyamides. Vysokom. soed. 1 no.3:378-386 Mr '59.

(MIRA 12:10)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
(Amides)

PAVLOVA, S.A.; RAFIKOV, S.R.

Effect of the structure of polymers on the properties of solutions.
Part 1: Viscosity of solutions and molecular weight of mixed polyamides.
Vysokom. soed. 1 no.3:387-394 Mr '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides)

RAFIKOV, S.R.; PAVLOVA, S.A.; TVERDOKHLEBOVA, I.I.

Effect of the structure of polymers. Part 2: Use of precision ebullioscopy in the determination of the molecular weight of polyaluminum organic siloxanes. Vysokom. soed. 1 no.3:400-403 Mr '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Molecular weights) (Siloxanes)

RAFIKOV, S.R.; SOROKINA, R.A.

Chemical transformations of polymers. Part 3: Thermal decomposition of polyamides. Vysokom.sped. 1 no.4:549-557 Ap '59.
(MIRA 12:9)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides)

PAVLOVA, S.A.; RAFIKOV, S.R.

Correlation between the viscosity of solutions and the molecular weight of polymers. Vysokom.soed. 1 no.4:623-626 Ap '59.
(MIRA 12:9)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Polymers) (Molecular weights)

RAFIKOV, S.R.

Viscometer for determining the viscosity of solutions of
high molecular weight compounds. *Vysokom.sped.* 1 no.10:
1558-1560 0 '59. (MIRA 13:3)

1. Institut elementoorganicheskiy AN SSSR.
(Viscosimeter)

SCV/153-2-4-27/32

5(1,3)
 AUTHORS: Savorov, B. V., Rafikov, S. R., Khmura, M. I., Kudinova, V. S., Kostromin, A. S.

TITLE: Direct Synthesis of Dinitriles of the Aromatic Sequence From Dialkyl Benzenes and Terpene Hydrocarbons

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i Khimicheskaya tekhnologiya, 1959, Vol 2, Nr 4, pp 614 - 618 (USSR)

ABSTRACT: Aromatic dinitriles are promising raw materials for the production of phthalic acids and diamines of the aliphatic-aromatic and alicyclic sequence. These again are the initial products for the production of polyesters and polyamides (Ref 1). The latter, however, can be directly obtained from dinitriles by their interaction with secondary and tertiary highly molecular alcohols (Ref 2). Hence the great interest in the new ways of producing dinitriles of various structures. After giving a survey of publications (Refs 3,4) the authors state that they have been dealing with the catalytic ammonolysis of organic compounds for years (Refs 5-7). With regard to their task of synthesizing dinitriles they pay special attention to the ammonolysis of dialkyl benzenes especially in the presence of air. The apparatus

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Direct Synthesis of Dinitriles of the Aromatic Sequence SOV/153-2-4-27/32
From Dialkyl Benzenes and Terpene Hydrocarbons

used for this purpose is filled with a granulated catalyst. Mixed catalysts of oxides of vanadium, tin, titanium, and some other elements with varying valence proved to be most effective. p-Xylene is the most accessible and promising raw material in the synthesis of dinitrile of terephthalic acid. Hence its transformations were investigated most thoroughly. Figure 1 shows the qualitative composition and the quantitative conditions of the reaction products of a characteristic experimental series. Hence it appears that oxidative ammonolysis yields a very complicated scale of substances. The main products, however, are the dinitrile and p-tolunitrile required. The composition of the reaction products greatly depends on the reaction conditions. The process can be directed to the special formation of any product by the choice of the respective reaction products. The structure of the initial product is also of importance. In addition to p-xylene, other p-dialkyl benzenes as well as hydroaromatic and terpene hydrocarbons underwent the reaction mentioned. All of them yielded terephthalic-acid dinitrile, and may thus be considered a source of reserve raw materials. Dinitriles of isophthalic and o-phthalic acid are

Card 2/3

Direct Synth is of Dinitriles of the Aromatic Sequence SOV/153-2-4-27/32
From Dialkyl Benzenes and Terpene Hydrocarbons

very interesting. In addition to xylene diamines (for the production of high-melting, fiber-forming polyamides), other valuable compounds can be obtained: orthoisomer (for phthalocyanine dyes (Ref 9), for refractory varnishes and glasses). Their yield exceeded 50%. The ammonolysis mentioned can also take place without oxygen (Ref 3), but the yield of dinitriles remains small (5-10%) (Fig 2). Aromatic aldehydes and acids react readily with ammonia under similar conditions and give nitrile yields close to theoretical ones (Ref 10). A report on the above work was given at the All-Union Conference on "Ways of Synthesis of Initial Products for the Production of High Polymers" which took place in Moscow from September 29 to October 2, 1958. There are 2 figures and 11 references, 8 of which are Soviet.

ASSOCIATION: Institut khimicheskikh nauk AN KazSSR (Institute of Chemical Sciences of the Academy of Sciences, Kazakh SSR)

Card 3/3

SOV/79-29-1-35/74

AUTHORS: Manukovskaya, L. G., Suverov, B. V., Rafikov, S. R.

TITLE: Oxidation of Organic Compounds (Okisleniye organicheskikh soyedineniy) XIX. On the Catalytic Oxidation of p-Xylene With Molecular Oxygen in the Liquid Phase (XIX. O zhidkofaznom kataliticheskom okislenii p-ksilola molekulyarnym kislородom)

PERIODICAL: Zhurnal obshchey khimii, 1959, Vol 29, Nr 1, pp 158-165 (USSR)

ABSTRACT: The oxidation of the alkyl benzenes with molecular oxygen is one of the most comfortable syntheses of noble oxygen-containing aromatic compounds. At present, acetophenone and methyl-phenyl carbinol are thus obtained from ethyl benzene (Ref 1), as well as the hydrogen peroxide of cumene from cumene (Ref 2), the p-tertiary butylbenzoic acid from p-tertiary butyl toluene (Ref 3), etc. In the last years many similar methods of synthesizing the terephthalic acid from p-xylene were devised from among which that having four stages (Ref 4) proved to be the cheapest. Although many scientists investigated the catalytic oxidation in the liquid phase (Refs 5-8) and described the technological scheme of the process in publications (Ref 4), some questions regarding the reaction mechanism re-

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SOV/79-29-1-35/74

Oxidation of Organic Compounds. XIX. On the Catalytic Oxidation of p-Xylene
With Molecular Oxygen in the Liquid Phase

mained unsolved, e. g. that on the nature of the catalytic action, on the dependence of the reaction rate and the yield of oxidation products on various concentrations as well as the question of the nature and succession of the transformation of the p-xylene itself based on oxidation, etc. The solution of some of these problems was the purpose of this paper. It was established that the oxidation of p-xylene without catalyst proceeds very slowly, wherein also the aromatic acids are formed in negligible quantities only. In the presence of cobalt acetate below 130° the oxidation proceeds at a very low rate as well. For this reason, all following experiments with the catalyst were carried out at 133-135°. Thus, the oxidation of p-xylene with molecular oxygen in the presence of cobalt acetate in the liquid phase was investigated, p-toluic and terephthalic acid resulting as the main products. In figure 1 the results of two experimental series with 0.1 and 1% cobalt acetate are presented in order to determine the influence exerted by the duration of the experiment upon the oxidation of p-xylene. Figure 3 illustrates the dependence of the yield of the main oxidation products of p-xylene on the concentration

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SOV/79-29-1-35/74

Oxidation of Organic Compounds. XIX. On the Catalytic Oxidation of p-Xylene With Molecular Oxygen in the Liquid Phase

of the catalyst. There are 5 figures, 1 table, and 21 references, 14 of which are Soviet.

ASSOCIATION: Institut khimicheskikh nauk Akademii nauk Kazakhskoy SSR
(Institute of Chemical Sciences of the Academy of Sciences
Kazakhskaya SSR)

SUBMITTED: December 11, 1957

SOV 3/3

SOV/79-29-1-34/74
AUTHORS: Kagarlitskiy, A. D., Suvorov, B. V., Rafikov, S. R.
TITLE: On the Reaction of Acetophenone With Gaseous Ammonia Over
Titanium Vanadate (O reaktsii vzaimodeystviya atsetofenona s
ammiakom v gazovoy faze na vanadate titana)
PERIODICAL: Zhurnal obshchey khimii, 1959, Vol 29, Nr 1, pp 157-158 (USSR)
ABSTRACT: On the basis of the synthesis of the trimethyl pyridine from
acetone and ammonia according to Chichibabin (Ref 1) it could
be expected that in the ammonolysis of acetophenone a 2,4,6-
triphenyl pyridine were formed. It was the objective of the
present paper to prove that this reaction can really take
place. Molten titanium vanadate was chosen as a catalyst
which, as previously established (Ref 7), has no bad de-
hydrating qualities. Already the first ammonolysis experiments
of acetophenone have shown that in this case really 2,4,6-tri-
phenyl pyridine results as the main product. This was obtained
under optimum conditions at 370-380° in a 35% yield, referred
to the transmitted, and in a 98% yield referred to the aceto-
phenone reacted which may easily be seen from the diagram. At
400° and more the yield decreased as crack reactions took place

Card 1/2

SOV/79-29-1-34/74

On the Reaction of Acetophenone With Gaseous Ammonia Over Titanium Vanadate

under the formation of low-molecular products. In the experiments performed below 350° the resinous products were separated on the surface of the catalyst, whereby its activity was reduced. It was however possible to restore its activity in the air current at 400° . The catalyst was made by melting titanium dioxide with vanadium pentoxide according to the formula $Ti(VO_3)_4$. There are 1 figure and 9 references, 5 of which are Soviet.

ASSOCIATION: Institut khimicheskikh nauk Akademii nauk Kazakhskoy SSR
(Institute of Chemical Sciences of the Academy of Sciences,
Kazakhskaya SSR)

SUBMITTED: November 22, 1957

Card 2/2

5(4)

AUTHORS:

Tsetlin, B. L., Sergeyev, V. A., SOV/20-126-1-33/62
Rafikov, S. R., Korshak, V. V., Corresponding Member AS USSR,
Glazunova, P. Ya., Bubis, L. D.

TITLE:

The After-effect in the Irradiation of Methylmethacrylate in
the Presence of Oxygen (Effekt posledeystviya pri obluchenii
metilmetakrilata v prisutstvii kisloroda)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 1, pp 123-125
(USSR)

ABSTRACT:

It is a known fact that oxygen inhibits the radical polymeriza-
tion of many vinyl monomers. This is the case also with
radiation polymerization (Ref 1). However, the irradiated
monomer is able to polymerize later, as soon as the supply
of oxygen is interrupted (Ref 2). This manner of utilizing
ionization energy is of practical interest. The authors
investigated the basic rules of this process. The monomer
was irradiated with fast electrons (900 kev) in an acceler-
ator of the second Institute mentioned under Association.
Figure 1 shows the kinetic polymerization curve in dependence
on the radiation dose R. The initial velocity V_0 of polymer-
ization is, as figure 2 shows, proportional to $R^{1/2}$.

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The After-effect in the Irradiation of Methylmethacrylate in the Presence of Oxygen

SOV/20-126-1-33/62

Figure 3 shows the influence exercised by temperature upon V_0 . Polymerization was introduced by evacuation. The activation energy was calculated as amounting to 11.2 kcal/mol. It is thus considerably lower than the activation energy in the polymerization of methyl methacrylate with benzoyl peroxide, which amounts to 19.7 kcal/mol. The high activity of the peroxide groups formed by irradiation facilitates polymerization at low temperatures. Figure 4 shows the development of polymerization by irradiation, and, as a comparison, the effect of 0.01 % benzoyl peroxide. Apart from the low reaction temperature, irradiation offers the further advantage that, after irradiation, polymerization may be begun at any desired point of time. There are 4 figures and 9 references, 5 of which are Soviet.

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The After-effect in the Irradiation of Methyl-
methacrylate in the Presence of Oxygen

SOV/20-126-1-33/62

ASSOCIATION: Institut elementoorganicheskikh sovedineniy Akademii nauk
SSSR (Institute of Elemental-organic Compounds of the Academy
of Sciences, USSR). Institut fizicheskoy khimii Akademii
nauk SSSR (Institute of Physical Chemistry of the Academy of
Sciences, USSR)

SUBMITTED: February 25, 1959

Card 3/3

SOV/80-32-2-27/56

AUTHORS: Kagarlitskiy, A.D., Suvorov, B.V., Rafikov, S.R.

TITLE: Ammonolysis of Benzaldehyde on Mixed Oxide Catalysts
(Ammonoliz benzal'degida na smeshannykh okisnykh katalizatorakh)

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol XXXII, Nr 2,
pp 388-391 (USSR)

ABSTRACT: During the interaction of benzaldehyde with ammonia in the
presence of titanium vanadate and tin vanadate benzonitrile is
formed with an output of 87 - 88%. Lophine is produced in
small amounts by a side reaction. Another side reaction is
the hydration of benzaldehyde to toluene.
There is 1 graph and 11 references, 2 of which are Soviet,
6 American, 2 English, and 1 German.

ASSOCIATION: Institut Khimicheskikh nauk Akademii nauk KazSSR (Institute of
Chemical Sciences of the Academy of Sciences of the Kazakh SSR)

SUBMITTED: June 12, 1957

Card 1/1

5 (3)

AUTHORS:

Refikov, S.R., Suvorov, B. V.,
Zhubanov, B. A., Khmura, M. I.,
Prokof'yeva, M. V.

SOV/20-126-6-39/67

TITLE:

Synthesis of Nicotinic Acid and Its Amides by Way of Nicotino-
-nitrile (Sintez nikotinovoy kisloty i yeye amida cherez
nikotinonitril)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 6, pp 1286 -1288
(USSR)

ABSTRACT:

In spite of an increasing demand of the substances mentioned
in the title (Refs 1,2) the methods of production applied, give
only low yields (Refs 3-5). The authors produced these two sub-
stances by saponification of nicotinic acid nitrile which is
formed in high yields in an oxidative ammonolysis of the β -pic-
oline on vanadium catalysts (Refs 6,7). β -picoline was isolated
from the corresponding industrially produced fraction. The men-
tioned ammonolysis was carried out in a continuous flow appara-
tus. Granulated tin-vanadate served as catalyst, air was used
as oxidizer. Ammonia was introduced into the reaction zone in
the form of a 20% aqueous solution. The duration of contact was
0.2 - 0.6 sec. Nicotino nitrile and the β -picoline which was

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Synthesis of Nicotinic Acid and Its Amides by Way
of Nicotino-nitrile

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not reacted were extracted by sulphuric ether, the extract was dried over roasted sodium sulphate and fractionated. In the saponification by means of water under pressure (with some drops of water - ammonia) nicotinic acid amide (melting point $129-130^{\circ}$) and nicotinic acid ($232-234^{\circ}$) were formed. Their yield depends on the reaction conditions of saponification. By changing these conditions either the acid or the amide may be obtained with quantitative yields. The duration of contact is without importance in the temperature range investigated for the β -picoline ammonolysis. Figure 1 shows that if the reaction temperature is increased from 310 to 370° the nicotino-nitrile yield is increased. A further temperature increase up to 400° reduces this yield. In this connection the CO_2 formation increases rapidly. It may therefore be assumed that at temperatures $>370^{\circ}$ reactions of an intensive oxidation take place besides the oxidative ammonolysis of β -picoline. Since the maximum yield of nicotino-nitrile (65% of the theoretically computed yield) and the minimum CO_2 formation were attained in the case of a 20-fold ammonia excess the processes of intensive oxidation are

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Synthesis of Nicotinic Acid and Its Amides by Way
of Nicotino-nitrile

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suppressed by ammonia. Thus, the mentioned ammonolysis produces high yields (over 65%) of nicotinic acid or nicotinamide (over 60%) with respect to the initial product. Oxidizers which are shortage goods are not used. Standard apparatus is necessary. There are 1 figure and 9 references, 6 of which are Soviet.

ASSOCIATION: Institut khimicheskikh nauk Akdemii nauk KazSSR (Institute of Chemical Sciences of the Academy of Sciences of the KazakhSSR)

PRESENTED: October 20, 1958, by M. M. Shemyakin, Academician

SUBMITTED: October 23, 1958

Card 3/3

RAFIKOV, S. K.

PHASE I BOOK EXPLOITATION
International symposium on macromolecular chemistry. Moscow, 1960.

Mezhdunarodnyy simpozium po makromolekulyarnoy khimii SSSR, Moskva, 14-18 iyunya 1960 g.; Doklady i vystupaniya. Summaries Held in Moscow, June 14-18, 1960; Papers and Summaries) Section III. (Moscow, Izd-vo AN SSSR, 1960) 469 p. 55,000 copies printed.

Tech. Ed.: P. S. Kashina.

Sponsoring Agency: The International Union of Pure and Applied Chemistry. Commission on Macromolecular Chemistry.

PURPOSE: This book is intended for chemists interested in polymerization reactions and the synthesis of high molecular compounds.

COVERAGE: This is Section III of a multivolume work containing papers on macromolecular chemistry. The articles in general deal with the kinetics of polymerization reactions, the synthesis of special-purpose polymers, e.g., ion exchange resins, semiconductor materials, etc., methods of catalyzing polymerization reactions, properties and chemical interactions of high molecular materials, and the effects of various factors on polymerization and the degradation of high molecular compounds. No personalities are mentioned. References given follow the articles.

Usanov, Kh. U., U. N. Musayev, and R. S. Tillyayev (USSR). The Radiation Method of Copolymerizing Acrylonitrile with Polystyrene and Perchlorovinyl 170
Rafikov, S. K., G. N. Chelpanova, I. V. Zhuravlev, and P. N. Vitykova (USSR). Oxyethylation of Carbochain and Heterochain Polyamides 184
Santo, I., and K. Gai (Hungary). Grafting Methyl Methacrylate Onto Films of Polyvinyl Alcohol Under the Action of X-Rays 207
Lazar, M., R. Rado, and Yu. Pavlinetz (Czechoslovakia). Grafting Methyl Methacrylate Onto Polypropylene and Polyethylene 214
Tutorskiy, I. A., Z. I. Smalov, and V. M. Bystray (USSR). The Interaction of Carboxyl-Containing Ethylene-Styrene Rubbers With Polyamides and E-Caprolactam 224
Kolmanikov, G. S., and Ts'eng Han-ming (USSR). Synthesis of Free Radicals on Crosslinking in Polyethylene Source of Free Radicals on Crosslinking in Polyethylene 250
Mladenov, I., I. A. Tutorskiy, and B. A. Dogudkin (USSR). On the Transformations of Carboxyl-Containing Ethylene-Styrene Rubbers and Their Mixtures With E-Caprolactam Under the Action of Gamma Radiation 293
Rogovin, Z. A., V. A. Derevitskaya, Sun T'ung, Chang Wei-xang, and L. S. Gilyayev (USSR). Synthesis of New Cellulose Derivatives and Other Polysaccharides 302
Yermolenko, I. M., and V. N. Kiputskiy (USSR). Initiation of the Controlled Synthesis of Modified Celluloses With Oxides of Nitrogen 310
Yanov, V. I., M. Ya. Leshina, V. S. Ivanova (USSR). Oxidational Transformations in Chains of Cellulose Molecules 321
Berlin, A. A., Ye. A. Penskaya, and G. I. Volkova (USSR). Mechanicochemical Transformations and Block Copolymerization During the Freezing of Starch Solutions 334
Usanov, Kh. U., B. I. Avkhodzhayev, and U. Azizov (USSR). Modification of the Properties of Cellulose by Grafting 344

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SOV/31-60-1.6/20

AUTHORS: Suvorov, B.V. and Rafikov, S.R.

TITLE: New Method to Synthesize Diamines and Dibasic Carboxylic Acids for the Production of High Polymers ↑

PERIODICAL: Vestnik Akademii nauk Kazakhskoy SSR, 1960, Nr 1, pp 44-50

ABSTRACT: This is a study - the 25th instalment of the serialized report on the "Oxidation of Organic Compounds" - of oxidizing ammonolysis reaction of aromatic hydrocarbons. In their experiments, which were carried out with the help of M.I. Khmura, V.S. Kudinova, A.S. Kostromin, A.D. Kagarlitskiy, B.A. Zhubanov and M.V. Prokof'yeva, the authors paid special attention to the study of the mechanism of catalytic ammonolysis of alkyl benzenes and the effect of different factors on the yield of nitriles. ↑
The reaction was carried out with an installation of the flow-through type with a metallic reaction tube of 1100 mm in length and an inner diameter of 21 mm. With the aid of dosing devices hydrocarbon, aqueous ammonia solution

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SOV/31-60-1w6/20

New Method to Synthesize Diamines and Dibasic Carboxylic Acids for
the Production of High Polymers

and, in most cases, air were introduced into the upper part of the reactor. The photograph gives the outer aspect of the installation. The reaction tube was filled with granulated catalyzer. During their experiments the authors tested a great number of different catalyzers. The results showed that catalysts of the mixed type, prepared on the basis of oxides of vanadium, tin, titanium and some other elements of changing valency, are most efficient. The basic particulars of the reaction mechanism of oxidizing ammonolysis of aromatic hydrocarbons were particularly ascertained in the experiments with monoalkyl benzenes [Ref 16], which transform into benzonitrile with a nearly theoretical yield. Dinitrile synthesis was studied on such objects as isomeric xylenes, p-cymene, p-diethylene and p-diisopropyl benzene and also on the example of terpene hydrocarbons [Ref 17, 20, 21]. For the synthesis of terephthalic dinitrile by means of

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New Method to Synthesize Diamines and Dibasic Carboxylic Acids for
the Production of High Polymers

catalytic ammonolysis of hydrocarbon the authors consider p-xylene as the most easily obtainable and prospective raw material. Its transformation, therefore, under the given conditions was an object of a particularly specified study. The authors investigated within large limits the effect of mutual correlation and volumetric feeding rate of the initial materials, of the time of contact, reaction temperature, catalyzers etc. The data shows that as a result of oxidizing ammonolysis of p-xylene a very great number of different substances will be obtained. The basic products of the reaction, however, are terephthalic dinitrile and p-tolunitrile. In the reaction products terephthalic acid is always present in the form of an ammonium salt. In experiments with comparatively low reaction temperature the formation of p-toluamide and terephthalic diamide can be observed. Gaseous reaction products are carbon monoxide, hydrogen cyanide, carbon

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SOV/31-60-1-6/20

New Method to Synthesize Diamines and Dibasic Carboxylic Acids for
the Production of High Polymers

dioxide. Their yield increases with rising temperature and may be considerable at 430-450⁰ C. In addition to p-xylene a number of other materials (other p-dialkyl benzenes, some hydroaromatic and terpene hydrocarbons) were subjected to oxidizing ammonolysis. The reaction was called so by the authors because the process of nitrile formation develops under the simultaneous action of ammonia and oxygen on the initial substance. There are 1 photograph and 33 references, 30 of which are Soviet and 3 English.

Card 4/4

86321

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S/190/60/002/012/005/019
B017/B055

AUTHORS: Rafikov, S. R., Pavlova, S. A., Tverdokhlebova, I. I.
TITLE: Dependence of Solution Properties on Polymer Structure.
III. Investigation of Solutions of Polydimethyl Siloxanes
PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2. No. 12,
pp. 1786-1793

X

TEXT: The authors studied the solutions of polydimethyl siloxane in chloro benzene and benzene at 20, 30, and 40°C, and in isooctane at 20 and 30°C applying the method of viscous flow, light scattering, sedimentation by ultracentrifugation, and diffusion. Fractional precipitation of polydimethyl siloxane with methanol from its 3% solution in benzene at 20°C yielded six fractions, the molecular weight of which was determined by light scattering. The results are given in Table 1. The viscosity of the polydimethyl siloxane solutions in chloro benzene at 20, 30, and 40°C is represented graphically in Fig. 1. The molecular weight of polydimethyl siloxane was calculated from the relation

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Dependence of Solution Properties on Polymer Structure. III. Investigation of Solutions of Polydimethyl Siloxanes

S/190/60/002/012/005/019
B017/B055

$$M = \frac{S \cdot R \cdot T}{D (1 - v \rho)}$$

where S = sedimentation constant, D = diffusion coefficient, R = gas constant, T = temperature in °K, v = specific partial volume of the polydimethyl siloxane and ρ = its density. The viscosity of polydimethyl siloxane solutions in chloro benzene, benzene and isooctane at 20, 30, and 40°C are shown graphically in Figs. 2 and 3. The viscosity of polydimethyl siloxane solutions in chloro benzene at 20 and 40°C and benzene at 20°C is a linear function of the concentration. By determining the viscosity and molecular weight, the authors obtained the constants K and a of the equation $[\eta] = KM^a$, which gives the relation between the intrinsic viscosity and the molecular weight. In Fig. 4, log[η] is plotted against log M for polydimethyl siloxane in chloro benzene and benzene. The dependence of log K on a, as calculated from the general formula

$$K = \frac{21}{m_0} \left(\frac{1}{2500m_0} \right)^a \quad (\text{Ref. 7})$$

is illustrated in Fig. 5. m₀ is the mean

molecular weight of the polymer. The values of K and a for solutions of polydimethyl siloxane in chloro benzene and benzene at 20 - 40°C are

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Dependence of Solution Properties on Polymer Structure. III. Investigation of Solutions of Polydimethyl Siloxanes

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listed in Table 3. The mean distance between the chain ends is described by the relation $(\bar{h}^2)^{1/2} = \alpha(\bar{h}_0^2)^{1/2}$. Fig. 6 represents the function

$(\bar{h}^2)^{1/2} = f(M)^{1/2}$ for chloro benzene solutions of polydimethyl siloxane at 20, 30, and 40°C. From this it follows that the root mean square distances between the chain ends of polydimethyl siloxane in chloro benzene and benzene increase with an increase in temperature. The constant A, which designates the ratio of the hydrodynamic diffusion and viscosity radii of macromolecules, was calculated from the relation

$A = \eta_0 T^{-1} D(M[\eta])^{1/3}$, where η_0 is the viscosity of the solvent in poise, T the temperature in °K, D the diffusion coefficient, M the molecular weight of the polymer and $[\eta]$ the intrinsic viscosity. In the case of the chloro benzene solutions of polydimethyl siloxane, A changes little with temperature variation, i.e. by $2.27 \cdot 10^{-10}$ to $2.8 \cdot 10^{-10}$ erg/degree. The relation between the diffusion coefficient, D, and the molecular weight of the polymer, M, was calculated and expressed as $D = 1.05 \cdot 10^{-4} M^{-0.547}$.

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Dependence of Solution Properties on Polymer S/190/60/002/012/005/019
Structure.. III.. Investigation of Solutions of B017/B055
Polydimethyl Siloxanes

There are 6 figures, 4 tables, and 12 references: 4 Soviet.

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR
(Institute of Elemental Organic Compounds of the Academy of
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SUBMITTED: May 12, 1960

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SUVOROV, B.V.; RAFIKOV, S.R.

New method for synthesizing diamines and dibasic carboxylic acids
for the production of high polymers. Vest.AN Kazakh.SSR 16
no.1:44-50 Ja '60. (MIRA 13'5)
(Amines) (Acids) (Ammonolysis)

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SOV/60-33-1-36/49

AUTHORS: Rafikov, S. R., Suvorov, B. V., Makarevich, V. G.

TITLE: The Liquid-Phase Oxidation of Cyclohexene With Molecular Oxygen in the Presence of Inhibitors. Communication XXIV

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol 33, Nr 1, pp 201-209 (USSR)

ABSTRACT: Auto-oxidation of cyclohexene in the presence of phenol, hydroquinone, p-benzoquinone, quinhydrone, dimethyl ether of hydroquinone, p-, and o-aminophenols, p-phenylenediamine, aniline, diphenylamine, and dimethylaniline was investigated. It was established that all the above compounds except dimethyl ether of hydroquinone are inhibitors of the reaction. Antioxidizing properties of the investigated compounds depend on their composition and on the structure. The degree of activity is as follows: phenol < hydroquinone < aminophenol < phenylenediamine > aniline. Dimethylaniline and diphenylamine occupy a place between aniline and

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The Liquid-Phase Oxidation of Cyclohexene
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p-phenylenediamine. The total antioxidizing effect depends not only on the individual activity of inhibitor, but also on its concentration. Most of the above inhibitors are capable of reacting with hydroperoxide of cyclohexene. The inhibiting action of compounds having phenolic character is connected with the presence of a mobile hydrogen atom of the hydroxyl group. In aromatic amines, not only the hydrogen atoms of the amino group take part in the process, but also, possibly, the unshared electron pair of nitrogen. The results of oxidation are given below in the following figures: (in all figures A = yield of the mentioned products (in %); B = time (in hr); 1 = without inhibitor).

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The Liquid-Phase Oxidation of Cyclohexene
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Inhibitors. Communication XXIV

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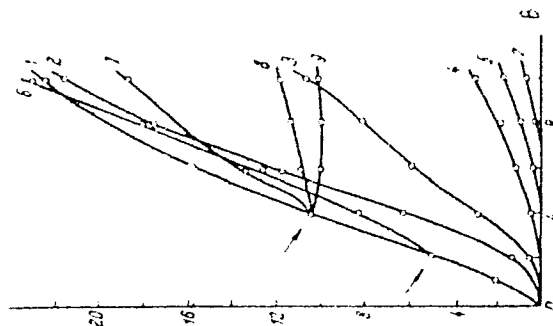


Fig. 1. Oxidation of cyclohexene (I) in the presence of phenol. Amounts are given in % of the corresponding inhibitors. 2 = 0.02, 3 = 0.05; 4 = 0.1, 5 = 0.2; 6 = 0.25; 7 = 0.5; 8 = 5.0, 9 = 10.0.

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The Liquid-Phase Oxidation of Cyclohexene
With Molecular Oxygen in the Presence of
Inhibitors. Communication XXIV

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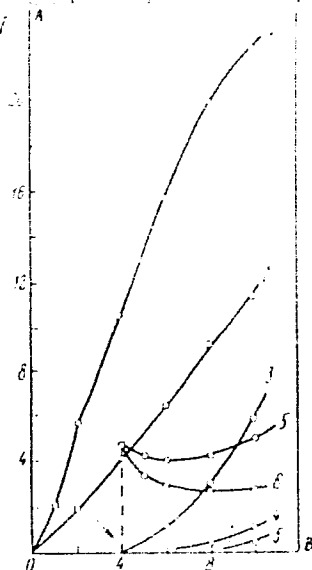


Fig. 2. Oxidation of I in the presence of hydroquinone:
2 = 0.05; 3 = 0.1; 4 = 0.25; 5 = 0.5; 6 = 1.0;
7 = 5.0; 8 = 10.0.

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The Liquid-Phase Oxidation of 2,3,5-Trihydroxybenzoic Acid
With Molecular Oxygen in the Presence of
Inhibitors. Oxidation Rate

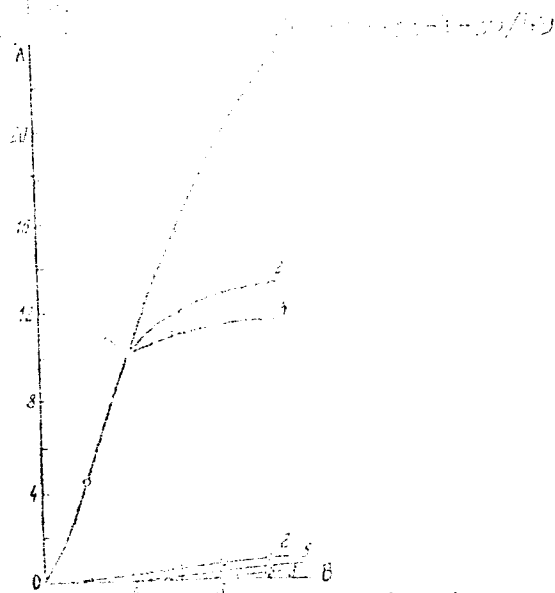


Fig. 3. Oxidation of 2,3,5-trihydroxybenzoic acid in the presence of quinone and quinhydrone: 2 = 0.1; 3 = 0.2; 4 = 1.0; 5 = 0.1, of quinhydrone.

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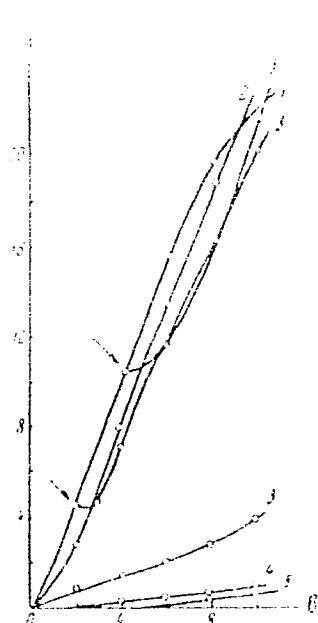


Fig. 4. Calculation of T in the presence of aniline:
 $\beta = 0.1$; $\delta = 0.2$; $\alpha = 0.3$; $\gamma = 0.4$.

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